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COBALT   XENON   ARGON

DesignerElements
3D Modeling User Guide

Cobalt, Xenon & Argon™

January 2003

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User Guide Documentation

This *User Guide* section of the manual is written for both Windows 98/NT/2000/Me/ Xp and Power Macintosh platforms. Before using this *User Guide* section, however, you will need to install your Designer Elements 3D modeling program (Cobalt™, Xenon™ and Argon™). Instructions and System Requirements are contained in the *Getting Started* manual. This manual is divided into sections which group chapters according to the topic. Each chapter provides information about tools, commands and other features.

Menus and Submenus

As is standard for all programs, Ashlar's Designer Elements 3D modeling programs provide menus and submenus for choosing commands and performing other operations.

Choosing Commands

As you proceed through the manual, you will be directed to choose commands contained in submenus of other menus, like the pull down menu. For example, you might be asked to select *Lock* in the Group submenu of the Layout menu. That appears in this manual as *Layout>Group>Lock*.

Margin Notes

Your Designer Elements 3D program includes margin notes that provide you with information that may help you use this program. There are three types of margin

notes: Tip, Tech Note and Referral. These notes are given special treatment so that you can instantly recognize their significance and locate them for future reference.

Tip

A tip provides instructions for getting the most out of this Designer Elements program. Tips may show you how to speed up an operation or how to perform some timesaving drawing technique.

Tech Note

A technical note provides additional technical information that may help when using a tool.

Referral

A referral directs you to related information contained somewhere else in the manual for the particular topic being addressed.

Style Conventions

This manual uses various style conventions which highlight certain terms or phrases. The list below includes and explanation and an example in parentheses. The conventions are as follows:

Bold	Tool palette names (**Light** palette); Tool names (**Single Line** tool); Keyboard-entered text; Definition terms (as shown in these style conventions)
Italic	Terms used for the first time in a chapter; (*Iso Lines*); Drafting Assistant notations (*midpoint*); tool and dialog box options (*Angle* box); book references (*User Guide*); Message Line directions (*Single Line: Pick the beginning point.*); margin note headings (*Tip*); menu commands (*Zoom Previous*); filenames (*prefs.ini*); stand alone extensions (*.dwg*); directory names; drawing names
Bold and Italic	Command series (***Layout>Group>Lock***)
ALL CAPITALS	Key names on the keyboard (ENTER, RETURN)
Title Capitalization	Dialog box names (Edit Objects); menu names (Pen menu); special Vellum phrases (the Drafting Assistant)

all lower case   File names (prefs.ini); stand-alone file extensions
                                  (.dwg)

Terminology

For those of you new to surface and solids modeling, there are many terms or
phrases that might be unfamiliar to you or used differently from your experience.
These terms are defined the first time they are used in the manual as well as in the
Glossary.

Some important terms include:

Curves   Refer to all lines, arcs, ellipses, conics, circles,
                                  splines and polygons created using one of the
                                  wireframe tools.

Instance   Refers to an object that's moved to or placed in a
                                  different location after performing an operation on
                                  it. If you create a solid, add a blend and move it,
                                  the solid is now an instance. The original is still
                                  located in the previous position although it is not
                                  displayed. If you create a master symbol, an
                                  instance occurs when you place the symbol in
                                  your drawing. An instance is associative to the
                                  original geometry. Any change made to the origi-
                                  nal is reflected in the instance (Cobalt™ and
                                  Xenon™ only). If you copy and pasted the object,
                                  the associativity is broken.

Parent/child   Refers to objects that are related to each other in
                                  such a way that changing one (the parent) affects
                                  the other (the child). This is an important feature
                                  in Cobalt™ and Xenon™. **Argon™ does not have
                                  this functionality.** This associativity works much
                                  the same way Vellum 3D or Vellum Solids worked
                                  with dimensioning objects and editing. When you
                                  change an object in Vellum, the dimension
                                  changes. Cobalt™ and Xenon™ have taken this
                                  idea to a higher level involving geometry. After
                                  creating a curve, extruding and then filleting it,
                                  you can go back to the first curve and edit it and
                                  the entire object adjusts. Cobalt™ and Xenon™

Cobalt and Xenon Only

have the intelligence to remember the relationship between the parent curve and all other operations performed on the resulting object.

Using the Mouse

The mouse is your communication device; you use it to tell the computer what you want to do. Use the mouse to indicate locations, choose commands, select tools and construct objects.

This manual uses the following terms for mouse activities:

Pointer	An arrow or any other graphic symbol that allows selection or creation of an object. Move the pointer to point to a command or an object on the screen. Depending on its location, the pointer is an arrow or may look like the current tool.

Arrow Pointer   Selection Arrow   Center-Point Circle

	To move the pointer, move the mouse on the mouse pad.
Point	Move the mouse until the pointer is over the item you want.
Press	Press and hold down the mouse button.
Click	Quickly press and release the mouse button once.
Double-click	Click the mouse button twice, quickly in succession.
Drag	Press and hold down the mouse button, move the mouse, then release the mouse button.

Chapter Breakdown

Referral:

Specific page information on a particular tool or command can be found in the index.

The chapters are grouped into nine sections dealing with a specific area.

Sections

1. Overview	Contains chapters that introduce you to some basic features of your Designer Elements 3D modeling

	program, including the program Window, the Drafting Assistant and information on selecting objects.
2. Setting the Environment	Contains chapters on pen and preference settings and drawing techniques.
3. Wireframe Modeling	This section contains chapters on using such curve tools as lines, arcs, circles, splines, polygons, etc.
4.Surface Modeling	Contains an introduction to surface modeling and information about surface modeling tools such as 3 Point Mesh, Mesh Curve, Infinite Plane, Skin, Net, Tube, Tangent, etc.
5. Solids Modeling	Contains an introduction to solids modeling and information on such solids modeling tools as the Sphere Primitive, Block Primitive, Cylinder Primitive, Lathe Solid, Pipe Solid, Blend Solid, Hole, Boss, Protruded Feature, etc.
6. Editing	Contains tools and commands for editing curves, surfaces and solids, including such tools as 2 Entity Fillet, Simple Trim, Connect Curve, Plane Surface Intersection, Boolean Surface, Subtract Solid, Shell Solid, Taper Solid, Deform Face, etc.
7. Adding Details	This section includes information on text, dimensions, patterns and fills, crosshatching and symbols.
8. Drawing Display	Contains information on viewing your geometry, layers, planes and rendering.
9. Documents	Contains information on file management, importing, exporting, page setup and producing production drawings.

Appendices

Operators	Describes all operators accepted by the data fields.

Special Characters	Lists all special characters not directly available from the keyboard and symbols that you can use in this Designer Elements program.
DXF/DWG Translator	Includes notes to help the user in successful .dxf/.dwg translation.
IGES Translator	Includes notes to help the user in successful *.igs* translation.
Short Cuts	Contains a list of the default Short Cuts
Spline Text Files	Provides instructions for creating spline text files to import.
Shader Attribute Definitions	Contains the definitions of shader attributes used when using the advanced shader rendering capabilities.

Other

Glossary	Defines terminology used in CAD drafting and in this Designer Elements program.
Index	List this Designer Elements program tools, features and actions and their page location.
Tips	Contains additional tips for using this Designer Elements program.

Graphics

Most of the graphics in the manuals apply to both platforms. In those instances that require a platform and software reference, a Windows graphic is used. When necessary, both Windows and Macintosh graphics are included.

On-Line Help

Designer Elements program Help (Windows only) provides a complete description of the program's many features, commands, and tools. The Help index is organized by menus and tools. The Macintosh Help uses the UserGuide PDF file that was installed when you installed the application.

First Look

This chapter describes the "first look" components of your Designer Elements program. A brief overview of useful features may be all you need to know if you are familiar with CAD software. The following topics are covered:

- Parts of the your Designer Elements program Window

- Menu Bar, including the dialog boxes

For more information about standard elements such as menus, scroll bars, File menu commands, and dialog boxes, refer to the Windows or Macintosh User's Guide that came with your computer.

Parts of the Designer Elements Window

When you start your Designer Elements program, the following window appears.

Title Bar	Includes the title of the active document and buttons for controlling the window including boxes for zooming and closing the program.
Menu Bar	Contains the Designer Elements program menus of commands and settings. You can make choices from the menus with the mouse or by using special key combinations.
Tool Palette	Contains drawing and editing tool icons you will use for constructing, editing and annotating geometry. This is the most basic tool palette. The **Surface** tool palette and **Solids** tool palette are not automatically displayed on start up, unless specified as such through Preferences. See Chapter 6.
Tool Tip	As you hold your cursor over one of the tools, a brief description of the tool is displayed. The Tool Tips function can be activated or deactivated by choosing *File>Preferences>General*. If you assign a short cut to a tool, the short cut displays with the tip.
Pointer	Shows the active position on the screen. For wireframe tools, when the pointer is in the drawing area, its shape represents the current tool.
Axis	Displays the current view orientation of the x, y and z axis in the center of your screen.
Triad	Displays the current view orientation of the x, y and z axis with a representation of the current work plane.
Location Indicator	Shows the x, y and z coordinates of the pointer location at the top of your drawing area.
Message Line	Displays the name of the current tool and step-by-step instructions for using the tool. For some tools, the Message Line includes an additional subpalette.
Drawing Area	Consists of multiple layers where you construct and annotate geometry.

Status Line	Shows the coordinate location and other geometric characteristics of the current construction based on the World coordinate system.
Coordinate System Axis	Shows the current coordinate system. You can choose between the default global or world coordinate system and a user-defined coordinate system.
Scroll Bars	Allow you to move around a drawing so you can see different sections of it through the Designer Elements program window. The scroll buttons allow you to move one line at a time.
Work Layer Indicator	Displays the name of the current layer and provides a menu for changing the work layer, creating a new layer and accessing the Layer Manager.
Memory Indicator	Displays two numbers. The first is the RAM available on your system and the second is the amount of virtual memory available (RAM plus swap).

Title Bar

The Title Bar includes the name of the current document, the Control Menu, Minimize and Maximize/Restore buttons (Windows) or the Close and Zoom boxes (Macintosh).

Windows

Close Button
Maximize Button
Minimize Button

Control Menu Button
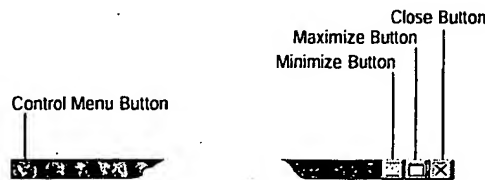
Control Menu Button	Allows you to close, move, and change the size of the window. This button is available on all windows and many dialog boxes. Double-clicking this button closes the window without displaying the menu. If you want to choose a different option from the Control menu,

click the button once to display the menu and then make your choice.

Minimize Button   Reduces the Vellum window to a task bar near the lower-left corner of the screen. This action does not close or save the document, it only shrinks the window to a task bar so you can perform some other Windows-related task. To display the window again, click once on the same button.

Maximize/Restore   Displays the window, full or partial screen. Once the window appears full screen, click the button again to restore it to its previous size.

Macintosh

Close Box   WindowShade   Zoom Box
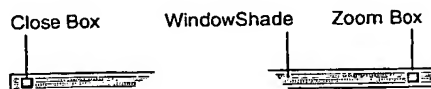
WindowShade   This WindowShade contains the Close Box and Zoom Box. You can set your computer to allow you to reduce your file to just the WindowShade. See the *User Guide* that came with your computer.

Close Box   Closes the window when you click on it. If you attempt to close the window without saving your work, your Designer Elements program displays a message so you can decide whether to save or not.

Zoom Box   Toggles the window size between the previous size and full size.

Tool Palette

A tool palette is a group of tool icons that represent tools for drawing, editing and annotating geometry. This graphic here is the main tool palette.

Selecting a Tool from the Tool Palette

1. Position the arrow pointer on the icon of the tool you want to use.

2. Click the mouse button.

   The icon appears highlighted to indicate its selection.

Selection tools
Line tools
Arc tools
Circle tools
Ellipse/Conic tools
Polygon tools
Spline/Helix tools
Text tools
Dimension tools
Fillet/Chamfer tools
Trim tools
Curve Utility tools
Transformation tools
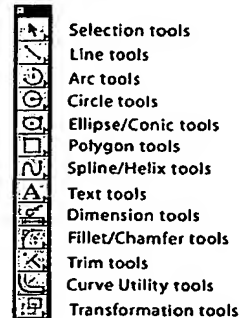
Floating Tool Palettes

All tool palettes in your Designer Elements program are floating tool palettes. Once a palette is displayed, you can move it to any location in your drawing area simply by dragging the palette by its title bar. You can save your palette to that location for future files by choosing *File>Preferences>General* and click the Save Now button.

Tool Subpalettes

Most of the tools in tool palettes contain a subpalette of tools with related functions. The (arrow) in the lower-right corner of the tool icon represents the presence of a subpalette which contains related tools. The next graphic shows the **Wireframe** tool palette.

Tech Note:

Macintosh only: If you are using more than one monitor with your computer, you can save your palettes to the other monitor.

Selection tools
Line tools
Arc tools
Circle tools
Ellipse/Conic tools
Polygon tools
Spline/Helix tools
Text tools
Dimension tools
Fillet/Chamfer tools
Trim tools
Curve Utility tools
Transformation tools
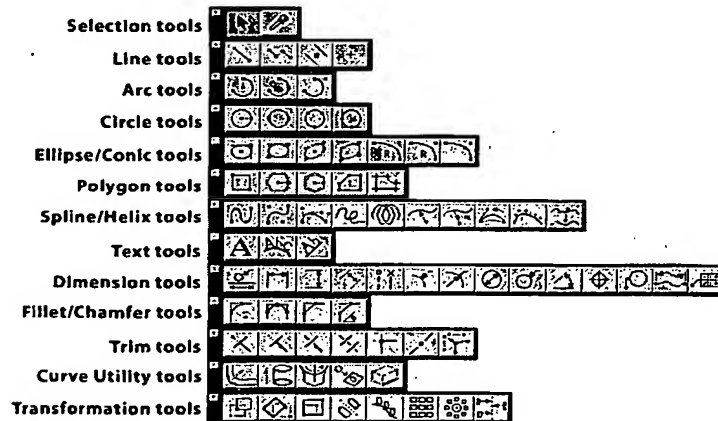
Viewing and selecting from a subpalette are similar to choosing a command from a menu.

Selecting a Tool from a Subpalette

1. Position the arrow pointer on the tool.

2. Press the mouse button.

   The subpalette appears to the right of the tool.

3. Drag the pointer to highlight the desired tool.

4. Release the mouse button.

   The selected tool replaces the previous tool in the tool palette. The highlighted icon in the tool palette shows that your selection from the subpalette is the active or current tool.

The new tool is visible in the tool palette until you select another tool from the same subpalette. The tools in the subpalette remain in the same order; only the tool displayed in the tool palette changes.

Once you select a tool, additional information appears to help with your construction. The Pointer, Pointer Locator, Message Line, and Status Line all provide feedback about the active tool.

If you want to select a tool already displayed in the tool palette, you only need to click it; you don't need to select it from the subpalette.

Tear Away Palettes

All tool palettes containing subpalettes are capable of "tearing away" from the parent palette located anywhere in your drawing area. The graphic here is the **Ellipse/ Conic** tool palette.

When you drag the mouse to the right across the subpalette beyond the last tool, the subpalette "tears away" from the parent tool palette. You can save the palette in this location by choosing *File>Preferences>General* and click on the Save Now button. Close the palette by clicking on the close button in its title bar.

· When you tear away multiple tool palettes and drag them near each other they snap to a left alignment.
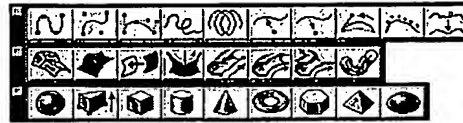
Smart Pointer & Wireframe Tools

When you select a tool and move the pointer into the drawing area, the pointer shape represents the tool.

Some of the pointers, like the Single Line pointer, are simple cross-hairs. Others, such as the Opposite-Point Circle pointer, resemble the tool.

The pointer, called a smart pointer, displays indicators for multi-step procedures. Each smart pointer has a dot, the hot spot, showing the next point you should specify. The dot changes position on the pointer during each step of the construction.

Hot Spot
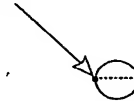
The smart pointer shows you where to click next.

· For example, the Opposite-Point Circle pointer, illustrated above, shows that the first click of the mouse places a point on one edge of the circle you're creating. After you click a location, the hot spot moves to the other side of the pointer, showing that the next click places a point on the opposite edge of the circle. See the graphic below.

Your first click

The hot spot moves to the other side of the smart pointer to indicate the next step.

After you click the second location, the circle appears. The hot spot moves back to its original position on the pointer so that you can create another circle.
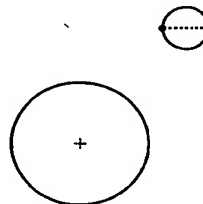
Location Indicator

The Location Indicator is located next to the Layer indicator at the bottom of the drawing area.

| X= -3.033" | Y= 0.467" | Z= 0.0 |
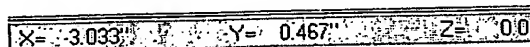
This indicator continuously tracks the pointer location when the pointer is in the drawing area, displaying the X, Y and Z coordinates of the current location relative to the origin. The origin (0,0,0) appears in the center of the screen when you open a new document. If you are displaying the Axis, the origin is at the intersection of the x, y and z axes.

Message Line

The Message Line across the top of the drawing area provides concise instructions for the use of the current tool.

Center-Point Circle: Pick Center [Ctrl = Copy Previous]

For example, after selecting the **Center-Point Circle** tool, the Message Line appears as illustrated here.

The instructions in the Message Line for some tools also indicate optional activities. For example, if you hold down the CTRL (Windows) or OPTION (Macintosh) key while using the **Center-Point Circle** tool, the next mouse click creates a copy of the last circle with the center placed where you clicked.

Status Line

The Status Line provides measurements, angles, X, Y and Z coordinates and delta values for the current construction. The current tool determines the number of status fields and which of the status fields highlights after the construction. For example, if you select the Center-Point Circle tool, the Status Line shows the X,Y and Z coordinates for the center of the circle and the length of the diameter.

| X -4.369 | Y 2.465 | Z 0.0 | D 1.552 |

Tech Note:
The number of decimal places displayed in the Status Line fields is determined by the decimal setting in the Units page of Preferences.
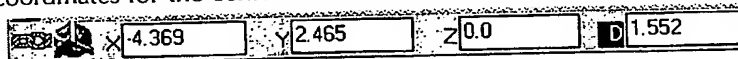
When you click the last point of the circle, the diameter (D) entry field highlights in the Status Line to indicate that it is active. It shows the diameter of the circle you just created. If you type a new number, and press the ENTER (Windows) or RETURN (Macintosh) key, the diameter of the circle you just created changes.

You can change any or all entries in the Status Line. If you change the entry before the tool operation, the values automatically register when you click in the drawing area for the particular operation. If you enter a value after the geometry is created and then press ENTER (Windows) or RETURN (Macintosh), the changes are made to the geometry and you can't make any more changes in the Status Line.

The number of decimal places displayed in the data fields is determined by the Precision setting in the Units page of Preferences.

The Status Line uses the *World coordinate system* for all values entered in the data fields. Values can be entered in inches, feet, millimeters, centimeters, meters and mathematical expressions (ex. 10"+2.54 cm).

When the units in Preferences are set to feet and inches, it's important to be aware of the following rules:

- All numbers are assumed to be feet unless accompanied by the unit symbol, like " for inches. Entering a 1.5 in the field is read as 1.5 feet. If you want 1.5 inches, enter 1.5", 1.5i, 1.5in, 1.5 inch, etc.

- If you want to enter fractions of inches, each entry must include the unit symbol. For example, 5 feet 6 5/8 inches must be entered 5' 6" 5/8". Internally this is converted as 5' + 6" + 5/8". If the inch symbol is not included with the fraction, 5/8 will be interpreted as a fraction of a foot.

Copying and Pasting Status Line Entries

You can copy and paste Status Line text for use in another data field.

For Windows, hold down the right mouse button and use the *Copy* and *Paste* commands available in the menu. You cannot use the *Copy* and *Paste* commands in the Edit menu.

For Macintosh, use z +C to copy and z +V to paste text. You cannot use the *Copy* and *Paste* commands in the Edit menu. These function only for your Designer Elements program data.

Moving between Status Fields

You can use the TAB key to move to the right, highlighting the next field. When you press ENTER (Windows) or RETURN (Macintosh), the entry either changes or the construction redraws according to the new specifications in the Status Line. You can also use your mouse to activate a Status Line field.

Use the Status Line arrows to scroll if any of the fields are off screen.

Tip:

You can also change objects with the Edit Objects command or double-clicking on the object to display the Edit Objects dialog box.

Expression Parsing

The status line entry fields also accept mathematical, trigonometric, and exponential operators. Position the cursor in the text field and type in the additional operation. See Appendix A for the list of supported operators.

Coordinate System Axis

The coordinate system axis, at the left of the Status Line, displays the coordinate system currently set for the file. You can choose either the Global (world coordinate system) or a user-defined coordinate system. Clicking on the axis displays a menu from which you set the coordinate system.

The default system is the Global coordinate system. See Chapter 7 for more information.

Axis

The Axis displays the current view orientation of the x, y and z axis in the center of your screen. When you change views, the axis will adjust accordingly. You can turn off the display by choosing *View>Show Axis*. If you do not want the Axis to display at start up, choose *File>Preferences>General* and deselect the Axis option.

Triad

The Triad displays in the upper-left corner of your drawing area to illustrate the orientation of the x, y, z axis and the work plane. The example below uses the default view definitions.

Top

Isometric

Trimetric

Front

Side
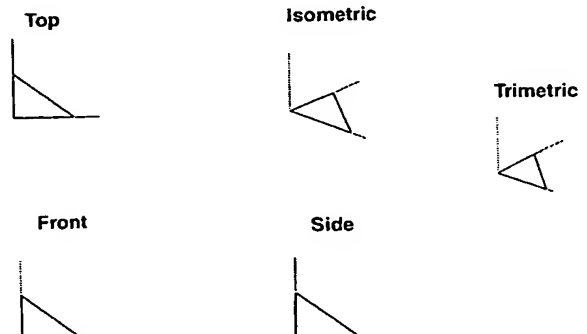
The Triad represents the principle of the right-hand rule—a memory aid for the relative directions of the positive axes. With your right palm upturned. the thumb (x) points right, the index finger (y) points straight ahead, and the middle finger (z) points up. If you move your hand to indicate the x and y-axes, you can easily see the direction of the z-axis.
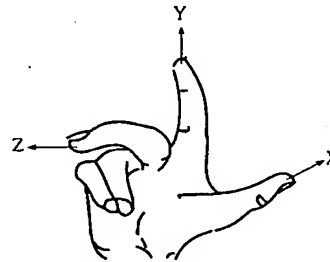
You can turn off the Triad by choosing, *Planes>Show Triad*. If you do not want the Triad to display at start up, choose *File>Preferences>General* and deselect the Triad option.

The Right Hand Rule

Drawing Area

You use the drawing area for all construction, editing and annotation of geometry. Think of the drawing area as a sheet of paper of unlimited size that you use to construct full-size unscaled drawings. You use the scroll bars to move the sheet so the portion you want to work on is visible in the window.

Displaying the Grid

If you wish to work with a grid in the drawing area, choose *Planes>Show Grid*.

If you choose *Window>Snap*, the Snap Options dialog box appears. Choose To Grid and your constructions snap to the grid, meaning that any geometry point that you click snaps onto the closest grid point.
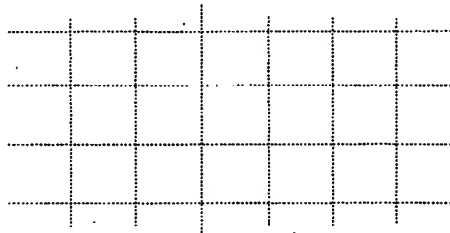
Scroll Bars

The scroll bars allow you to move the sheet up and down or right and left. You can display different parts of the drawing sheet by dragging the slider of a scroll bar to the approximate location. For example. the right, center, or left position in the horizontal scroll bar displays the right side, middle, or left side of the drawing, respectively.

You can also click the arrows at the end of the scroll bars to move the sheet one line at a time.

Work Layer Indicator

The Work Layer Indicator in the lower-left corner of the screen shows which layer is the current work layer. New geometry goes on the work layer. If you want your construction to go on a specific layer, first make it the current layer.

You can select the work layer in two ways:

- Click on the arrow to the left or right of the layer name and the layer will move backward or forward to another layer.

- Position the pointer over the Work Layer Indicator, then press the mouse button. All available layers are then displayed in a pop-up menu from which you can select a different layer to be the current work layer. Drag to the new work layer. All new geometry will be placed on that layer. You can also create a new layer and display the Layer Manager from the Work Layer Indicator.
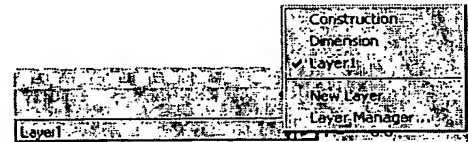
Memory Indicator

The Memory Indicator field displays two numbers, the amount of RAM available on your system and the amount of virtual RAM (RAM plus swap). For Macintosh users, when the value reaches 5 MB use extreme caution because your Designer Elements program may crash. You are advised to save your files, close the program and then restart it.

Remember that the minimum required RAM for your Designer Elements program is 256 MB. The recommended RAM is 512 MB.

Menu Bar

Your Designer Elements program menus contain related commands and settings.

File   Contains commands that affect entire documents (files), including opening and closing files, setting

preferences and defining your Print Setup (Windows) or Page Setup (Macintosh).

Edit
Contains commands to select and manipulate objects. These include such things as copying and pasting as well as changing an object's direction, resolution, layer and type.

Layout
Contains commands and settings that specify the drawing area and provide program features and functionality such as the Grid, Layer Manager, Group and Align.

View
Contains commands for displaying your document and includes choosing and setting views and zoom options.

Planes
Contains commands for choosing and defining the work plane.

Pen
Contains commands to specify pen characteristics (color, weight, and pattern), polygon patterns, polygon fill, crosshatching and arrows.

Text
Contains commands to set the font, size, style and case of your text (lower, upper and title capitals).

Dimension
Contains commands that specify dimensions, their format and tolerance.

Verify
Contains commands to obtain information about your file and specific objects in your file. These include properties of an object, direction, curvature and object counts.

Window
Contains commands for displaying tool palettes, the Design Explorer, Trackball, etc.

PhotoRender
Contains commands for rendering your geometry, setting options for rendering and placing lights.

Animation
Contains commands for generating Quicktime movies.

Help   Contains commands to access the on-line help file (Windows only).

Displaying a Designer Elements program Menu

1. Point to the menu name.

2. Click on the name.

    The menu appears. If you want to dismiss the menu without making a choice, click outside the menu.
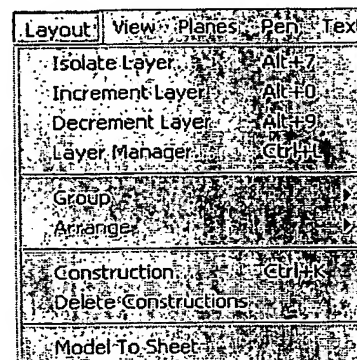
Choosing a Command from a Menu

1. Point to the menu name.

2. Click on the name.

    The menu appears.

3. Click on the command.

    The command executes. or the setting. such as *Snap To Grid*, toggles on or off.
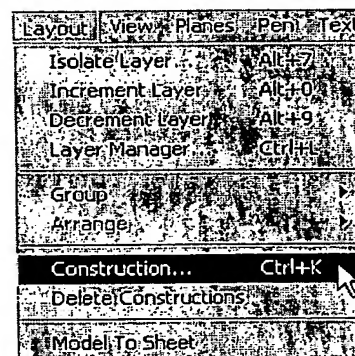
Mouse versus Keyboard

Designer Elements program menu items can be chosen with the mouse or with a combination of keys on the keyboard. For example. you can use various methods for displaying the Edit menu.

Windows and **Macintosh**:

• Click on Edit in the menu bar.

Windows only:

• Press the ALT key and then type **E**.

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- Press the ALT key and then press the RIGHT ARROW key until Edit is highlighted in the menu bar; then press ENTER.

You also have various methods for choosing commands with the keyboard. For example, you can use any of the following methods to choose *Planes>Show Grid*.

Windows:

- Press ALT and **L** and then type **G**.

- Press ALT and then use the RIGHT ARROW key to highlight Layout and press ENTER. Then press the DOWN ARROW key to move the highlighted area to *Show Grid* and press ENTER.

- Hold down the CTRL key and type **G**.

The first method is the mnemonic method. Press the ALT key with the appropriate letters for the menu and command as indicated by the underlined character in the names.

Macintosh:

- Hold down the z (command) key and type **G**.

The third method for Windows and the only one available for Macintosh is a keyboard accelerator. When available it is denoted by the key sequence listed on the menu.

While keyboard functionality is always available, this manual generally describes making choices with the mouse.

Submenus

Commands followed by an arrow symbol have submenus which display when the command is highlighted.

1. Pull down the menu.

2. Click on a command followed by an arrow symbol.

   The submenu displays.

3. Click on the submenu.

4. Click the desired command.
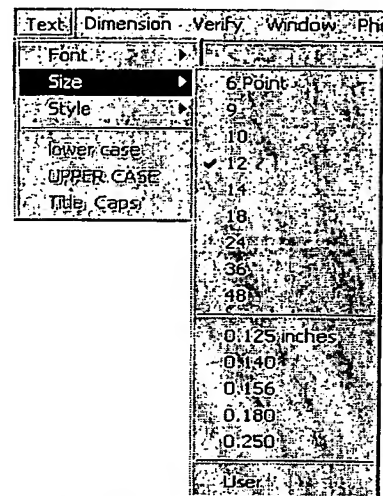
Dialog Boxes

When you choose a command followed by an ellipsis (...), such as *Edit Objects* in the Window menu, a dialog box appears.

Dialog boxes allow you to qualify the command you chose by adding information. For example, in the Edit Objects dialog box here, you can change the specifications of the selected object.

If a dialog box obscures your view of the drawing area, you can move it to a new location by dragging it with the pointer on the Title bar.

Tip:

Windows only: You can also hold down the ALT key and type a letter to select the first item that begins with that letter, then use the arrow keys to move to the selection you want. Once your choice is highlighted, press the ENTER key.

Tech Note:

Windows only: Designer Elements program dialog boxes do not support using the large font setting in the Setting page of the Display Properties dialog box for your Operating System.

Tech Note:

If you want to copy and paste data between data fields in dialog boxes, you cannot use the Copy and Paste commands. For Windows, press the right mouse button and use the commands in the menu. For Macintosh, use ctrl+C to copy and ctrl+V to paste.

Option Buttons

Option buttons indicate mutually exclusive choices; you can select only one option at a time. Click the option you want and the button turns black, as shown by the inches option below.
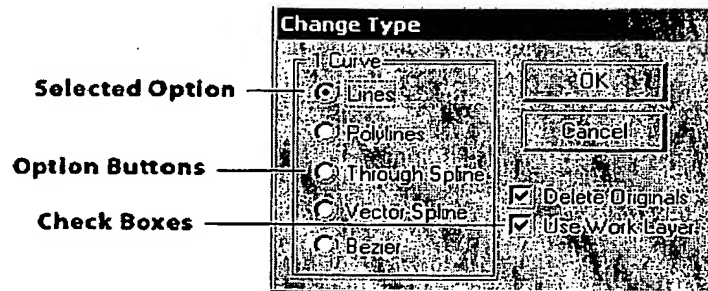
Check Boxes

Check boxes, as shown above, provide options you can switch on and off and which are not mutually exclusive. A check mark shows the option that is set.

List/Entry Fields

Some dialog boxes contain lists of options, displaying an arrow to provide access to the list.

If the entry includes an arrow, you can display a menu which works like a submenu on the menu bar but the item you specify appears in the field once you select it.

Some list fields also allow you to type an entry. For example, you can type a value in the Scale entry field in the Drawing Size dialog box or choose from the pull-down menu, indicated by the arrow. See the graphic here.
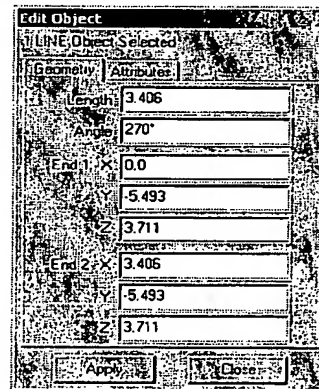
To type an entry, select the current entry (if it isn't already selected); then type a new entry. In most cases, clicking OK; saves the changes.

Asterisks

When an item in the dialog box displays an asterisk (*), you can specify a value by clicking or dragging in the drawing area. This feature is particularly useful for specifying location because you don't need to know any x, y and z coordinates.
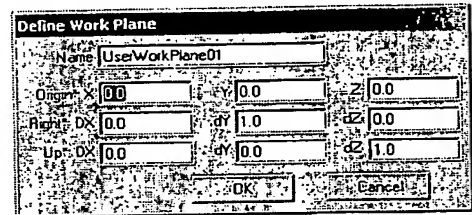
Apply Buttons

Some dialog boxes have an Apply button that allows you to apply the specification you just set. You can leave the dialog box open to set other specifications.

For example, once you make a change to an object in the Edit Objects dialog box, you can click apply and leave the dialog box open for future changes.

Closing a Dialog Box

If a dialog box contains an OK or Cancel button or an action button such as Open, the dialog box closes when you click the button. Otherwise, you dismiss the dialog box manually by double-clicking the Control Menu (Windows) or clicking the Close Box (Macintosh) in the upper-left corner of the box.

Toggling Commands

Commands that set a condition (such as *Snap To Grid* and *Arrow At Start*) display a check mark in the menu to indicate that they are active. To turn a command off, choose it and the check mark will disappear.

In the case of pen patterns and text characteristics, the check shows the current setting.

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The Drafting Assistant

The Drafting Assistant is the feature that makes your Designer Elements program unique among design and drafting software products. The Drafting Assistant thinks like a drafter; it automatically knows where you typically want construction lines and displays them temporarily when you need them.

The Drafting Assistant also makes it easy to select existing points for construction by displaying information about the pointer's location in the drawing area. If a Drafting Assistant notation displays when you click, the construction snaps onto the geometry precisely, without requiring finely tuned eye-hand coordination or tedious selection of special modifiers, modes, or other specialized construction tools.

The following topics are covered in this chapter:

- Snapping onto Geometry

- Drafting Assistant Construction Lines

- Permanent Construction Lines

- Drafting Assistant and Display

Snapping onto Geometry

When the pointer is in the drawing area, it has a snap point function. The snap point locks onto specific points on existing objects as you move the pointer near them.

The Drafting Assistant tells you when the snap point is *on* an object.

The Drafting Assistant displays information about the location of the snap point. This information appears either beside the pointer or next to the object itself.
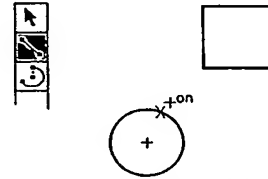
The Drafting Assistant snapping onto a circle
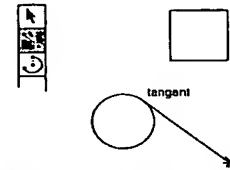
The Drafting Assistant displaying the relationship between the circle and the line that is being constructed.

The Drafting Assistant tells you when a snap point locks onto object points.

center

The center of an arc or circle. Move the pointer across the arc or circle to display *on* for the arc or circle, then move the pointer near the center to display the *center* point notation.

endpoint

The endpoint of lines, arcs, circles, ellipses and splines.

midpoint
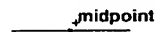
The midpoint of lines, arcs, circles, ellipses and splines.

intersection
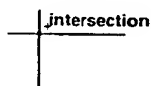
,intersection

The intersection of two curves (permanent and the Drafting Assistant's dynamic construction lines).

quadrant
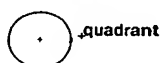
,quadrant

Quadrant points on an arc or circle displayed at 3 o'clock, 6 o'clock, 9 o'clock and 12 o'clock.

vertex

,vertex

The vertices of an ellipse, spline, or dimension point.

Using Tangents and Perpendiculars

If you click a point *on* an arc or circle and drag the pointer away at about a 45° angle, the Drafting Assistant locks onto the *tangent*. If you drag away at a 90° angle the Drafting Assistant locks onto a *perpendicular*.

tangent

Tangent
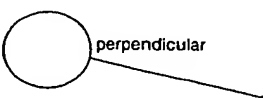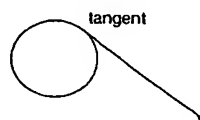
perpendicular

Perpendicular

If you continue holding down the mouse button, the line remains *tangent* or *perpendicular* while you drag the ending point around the object.

This is a useful feature if, for example, you want to create a line from and tangent to an existing circle to the tangent point of another circle.
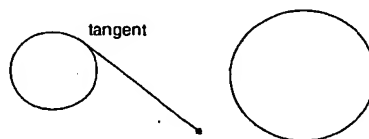
tangent

Once a line is *tangent* to the circle, you can drag it to the tangent point on the other circle, with the tangency maintained at both ends.
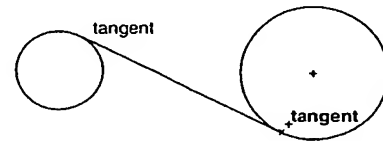
The Drafting Assistant locks onto a *tangent* or *perpendicular* only when the Drafting Assistant starts from the *on* notation. You cannot begin from a specific point, such as *endpoint, quadrant* or *vertex.*

Drafting Assistant Axis Locking

The Drafting Assitant support locking to the X, Y or Z axis. To lock to one of these axis hold down the corresponding key on your keyboard (X, Y or Z). The Drafting Assistant will only show alignment points in that axis.

Customizing the Drafting Assistant

When you first start your Designer Elements program, the Drafting Assistant automatically activates. You can customize the Drafting Assistant in a few different ways by using the *Snaps* command or changing your preferences in the *Snap* page of the Preferences dialog box.

Snap Command

This command, found in the Window menu, displays the Snap option dialog box and allows you to activate and deactivate the different snaps modes of the Drafting Assistant.

When an option activates the Drafting Assistant operates in the following manner as a pointer moves across geometry:

Snaps Enabled	The Drafting Assistant is enabled. Snaps that are checked display. (De-selecting this option is the same as turning the DA off.)
Endpoints	Object endpoints display.
Midpoints	Object midpoints display.
Curve Intersections	Intersections between objects display.
Curve On	The point nearest to the pointer displays with an *on* notation.
XYZ Align	Alignments along the x, y and z axes display.
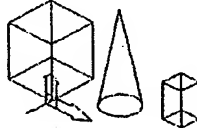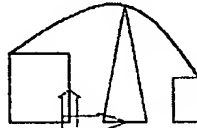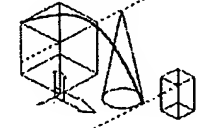
Tangents/Perpendiculars	Tangents and perpendiculars for your geometry displays.
Face On	A face notation displays for solid objects.
Edge On	All notations normally associated with curves, such as endpoint, midpoint, and vertex display for solid objects.
Work Plane	This snap option allows you to create a curve using referencing points on 3D objects but confined to your current 2D work plane. This snap works best when you are viewing your current work plane. See the example here for clarification.

Example: You have three objects from which you want to reference points. Display the Work Plane icon for the Front plane.

Change the view to front and draw a curve using the points from the objects with the help of the Drafting Assistant.

Change the view and you can see the curve aligned with the current work plane. The dotted lines show that the curve aligns with the object points.

To Grid	When using the grid, this option snaps to grid alignment points.
Plane Only	Snap points are given for objects **only** on the current work plane.

Each of these snap options have Short cut equivalents. See the "Short Cuts" section in Chapter 6 for more information on using Short cuts.

To turn off an option, click the check box to remove the mark next to the option name. By default, *Solid Face Projections, Project to Work Plane, To Grid* and *Plane Only* are turned off.

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Drafting Assistant Preferences

When you choose, *File>Preferences>Drafting Assistant*, the following dialog box appears.
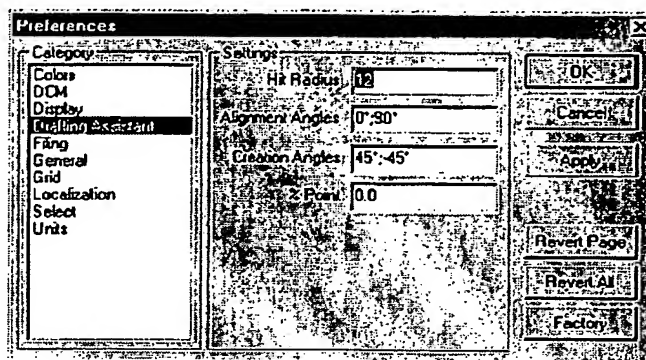
The *Drafting Assistant* page of Preferences includes the following options:

Hit Radius

This setting determines the detection distance in pixels. When the pointer is within the specified Hit Radius, the Drafting Assistant notations are displayed and the object is selected when you click the mouse. The default Hit Radius is 12 pixels.

If you can't specify locations that are close together because the Drafting Assistant snaps to an existing control point, you can do any of the following:

• Decrease the Hit Radius.

• Zoom in so more pixels separate the existing point and the point you want to select.

• Lock on a point by pressing the mouse button and typing the letter that represents the point (*m* for midpoint, for example).

If you set the Hit Radius to zero, you disable the single click selection of the **Selection** tool (dragging a selection fence and double-clicking to select all objects will still work). Instead, you

might consider using the *Select Mask*
in the Window menu to specify that some objects
cannot be selected.

Alignment Angles

These angles define the dynamic construction lines
that the Drafting Assistant automatically uses. If
you want to change the orientation of your draw-
ing, you can change these specifications.
For example, you could set these angles to 30°, 90°
and 150° for an isometric drawing. The defaults are
0° (horizontal) and 90° (vertical). Use a semicolon
to separate the values.

To display a dynamic construction line through
a point, move the pointer to the point to activate
it (a diamond appears); construction lines automat-
ically display through the active point. You can
have as many as eight active points. When you
activate the ninth point, the first one in the series
deactivates.

Creation Angles

These lines are used by the Drafting Assistant only
when you are creating geometry and they are not
part of the list of lines generated from the eight
active points. The defaults are 45° and -45°. Use a
semicolon to separate the values.

% Point

The divisions of a line for Drafting Assistant nota-
tions. If you want to divide the line into quarters,
use a 25 specification. The default is 0.0.

——————————————%point

For example, entering 25 instructs the Drafting
Assistant to tell you when the pointer is 25% of
the distance along a line.

Drafting Assistant Construction Lines

In addition to snapping onto geometry, the Drafting Assistant displays *dynamic
construction lines*. The three types of construction lines you use most frequently—

vertical, horizontal and 45° angle lines—display automatically during construction. These construction lines appear temporarily to help you align geometry. Once you've set a point, the Drafting Assistant construction line disappears—your drawing is not cluttered with extraneous lines.

Dynamic construction lines extend automatically from the last point you created. You may want to activate other points so the Drafting Assistant displays construction lines relative to them. Simply move the pointer over the geometry to activate or "wake-up" its control points, then move away horizontally or vertically.

Of course, you also have the option to create *permanent construction lines* and other shapes, as described later in this chapter.

Using the Drafting Assistant's Construction Lines

After you've indicated the first endpoint of a line, move the pointer horizontally, vertically, or in a 45° direction, the dynamic construction line appears. The figure here illustrates a 45° construction line relative to the endpoint of an existing line.

on

align:45°
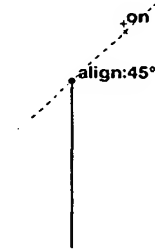
Displaying Dynamic Construction Lines while Constructing Geometry

1. Click a point to begin new geometry.

2. Move the pointer away from the point horizontally, vertically, or at a 45° angle.

3. While the construction line is visible and the Drafting Assistant displays *on*, click the next point.

The point is placed exactly on the construction line, even though the pointer wasn't exactly on that line when you clicked. The dynamic construction line disappears.

Displaying Dynamic Construction Lines with Existing Geometry

1. On selected geometry, without pressing the mouse button, move the pointer over an existing point.

    The point notation (*endpoint* or *midpoint*, for example) shows that the point is active.

2. Move the pointer horizontally or vertically.

    A construction line appears through the point.

3. While the construction line is visible and the Drafting Assistant displays *on*, click the desired point in the construction.

    The point is placed exactly on the construction line, even though the pointer wasn't exactly on that line when you clicked. The dynamic construction line disappears.

The figure here illustrates intersecting construction lines drawn through two existing, active points.
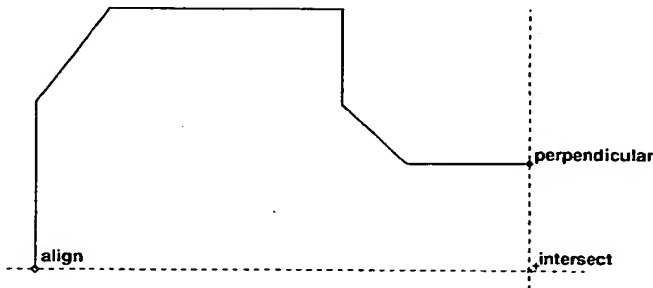
Once you are familiar with the Drafting Assistant, you'll see how much your Designer Elements program streamlines design and drafting tasks!

Setting New Drafting Assistant Construction Angles

You can add to or change the angles that the Drafting Assistant uses for dynamic construction lines by choosing *File>Preferences>Drafting Assistant*. Enter the new construction line angles, separated by semicolons, in the Alignment and Creation Angles fields.

Locking the Drafting Assistant to Work Plane

By holding down the Shift key, the Drafting Assistant locks to the x, y and z axes of the work plane. Only *align:x, align:y* and *align:z* construction lines appear.

Permanent Stroke Construction Lines

In addition to the Drafting Assistant's dynamic construction lines, you may want to create construction lines that display until you hide or remove them.

Stroke construction lines are lines that you create with the mouse. Hold down the SHIFT+CTRL keys (Windows) or the z key (Macintosh) and drag the mouse horizontally or vertically. Since you are working in the drawing area, the Drafting Assistant helps you place the stroke precisely.

Tip:

You can use strokes to create construction lines while you are in the process of using a tool.

Windows users: When both the CTRL and SHIFT keys are used by a tool, Stroke construction lines cannot be created while in the tool.

Construction lines automatically appear on the Construction layer, not the work layer of your drawing. If you have inadvertently deleted the Construction layer, it recreates the next time you create a construction line.

You can hide the construction layer to view or print the drawing without construction lines. You also can select construction lines in the usual manner from any layer; the Construction layer doesn't have to be the work layer. (More information on layers can be found in Chapter 31).

When you want to get rid of all construction lines, choose *Layout>Delete Constructions*. Everything on the construction layer deletes and not just the construction lines.

Holding down the SHIFT+CTRL keys (Windows) or the z key (Macintosh) changes the mouse pointer to the Stroke pointer (z).

⌘ — *Drag* the pointer horizontally or vertically

Drag	Result
Vertically	A vertical construction line appears through the first point of the stroke.
Horizontally	A horizontal construction line appears through the first point of the stroke.
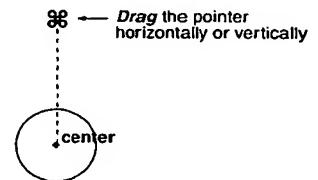
Using Stroke Construction Lines

Construction lines are as long as the dimensions of the viewing area of the screen or the printing region (as designated in *Print Setup* (Windows) or *Page Setup* (Macintosh) in the File menu), whichever is larger.

For example, if you are using the **Connected Lines** tool, you can create a construction line that extends through the center of a circle:

1. Hold down the SHIFT+CTRL keys (Windows) or the z key (Macintosh). The pointer becomes the stroke pointer (z).

2. Move the pointer near the center of the circle.

    The Drafting Assistant snaps onto the *center* point.

3. Drag the mouse vertically or horizontally away from the *midpoint.*

    The construction line appears through the center and you are still in the process of creating connected lines after releasing the SHIFT+CTRL keys (Windows) or

the z key (Macintosh).

The Construction Command

Stroke construction lines are useful for creating lines through existing points. If you want to create a construction line at a location other than an existing point or at a particular angle, you can use the *Construction* command.

Using the Construction Command - CTRL+K (Windows); z +K (Macintosh)

This command in the Layout menu creates a construction line on the construction layer of the current document.

You can specify the angle of the construction line or the offset from a reference point defined by the X, Y coordinates. The asterisk shows that the values can be specified by clicking or dragging the mouse; values can also be typed into the fields.

The distance dragged will always be entered in the Offset data field as a positive value, regardless of the direction dragged.
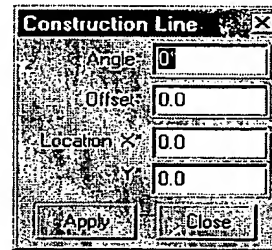
You can only enter one set of values for a new construction line at a time. You cannot enter multiple angles to create multiple construction lines.

Specifying the Construction Line Angle with the Mouse

1. Click the *Angle* field.

2. Drag a vector in the drawing area.

The angle of the vector line appears in the *Angle* field.

Specifying the Construction Line Offset with the Mouse

1. Click the *Offset* field.

2. Drag the offset distance in the drawing area.

The distance you drag appears in the *Offset* field. Be aware that the offset is determined by the angle of the construction line as shown.
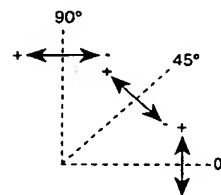
Specifying X,Y Coordinates with the Mouse

The coordinates of the last point you specified appear in the *X* and *Y* fields, but you can change them by doing the following:

1. Click the X field.

2. Enter new coordinates

   or

   In the drawing area, click the location of the point through which the construc-
   tion line should pass. The coordinates are entered automatically for both the X
   and Y fields.

Creating Parallel Construction Lines

You can create parallel construction lines by creating one construction line using
this field, then creating new lines with the **Parallel Line** tool.

Creating Construction Geometry

Non-construction geometry is placed on the work layer. You can create temporary
construction geometry, such as arcs or circles, by making the construction layer the
work layer, creating the geometry and switching to another layer to continue your
work.

Creating Construction Geometry

1. In the Layout menu, choose *Layer Manager.* (The dialog box will say Design
   Explorer because to two boxes [Design Explorer and Layer Manager] are com-
   bined.)

2. Click in the work layer column
   just to the left of Construction.
   (Move the pencil to that layer.)

3. Click OK. The Layer Manager
   closes and the Construction
   layer is now the work layer.
   You will note this in the *Work
   Layer Indicator* at the bottom
   left of your screen.

4. Create the geometry you will
   use for construction.
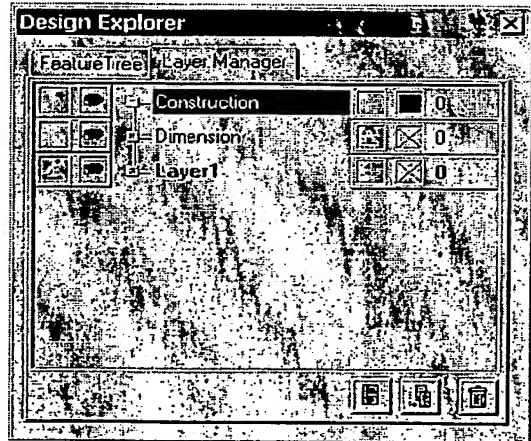
Tech Note:

If you create construction
geometry on the construction
layer, be sure you change
layers before creating your
actual geometry. When you
choose Layout>Delete Con-
structions, everything on the
construction layer is deleted
and not just construction
lines. Choose Undo to
restore your geometry and
move it to another layer

5. When the construction geometry is complete, make another layer the work layer by changing the layer in the Layer Manager or the Work Layer Indicator.

6. Continue your work.

Once you no longer need the construction geometry, choose *Layout>Delete Constructions* to remove all geometry on the construction layer.

Removing Construction Lines

If you have many construction lines and you want to delete only one or two of them, select the lines you want to remove, and then choose the BACKSPACE (Windows) or DELETE (Macintosh) key. You can remove all the construction lines that you've created by choosing *Layout>Delete Constructions*.

Delete Constructions

This command in the Layout menu deletes all construction lines and any geometry on the construction layer. The Drafting Assistant's dynamic construction lines appear only temporarily and are not affected by this command. Any geometry on the construction layer (regardless of the pen style used) deletes by this command.

You can retrieve deleted construction geometry with the *Undo* command.

Drafting Assistant and Display

The Drafting Assistant enables you to accurately create and place objects. When you create an object that shares a common control point with another object, both control points are in the same X, Y, Z location.

If you zoom in on that specific control point, depending on the resolution capabilities of your monitor, it may appear that the objects are not connected at the control point. This is a limitation of your hardware. The Drafting Assistant has correctly located your geometry.

The Drafting Assistant

Selecting Objects

Once you've constructed objects, you may want to make changes. To do so, you will have to select the desired object. In your Designer Elements program, the step at which you select the object depends on the operation you want to perform. In both cases it, modifying an object is always a two-step process.

Modifying with a Tool

1. Select the tool.

2. Select the object to be modified.

For example, use the **Divide** tool to divide a curve into multiple pieces.

Modifying with a Menu Command

1. Select the object.

2. Specify the action for the selected object.

For example, you could select a circle and then change the pen pattern to Center to indicate a bolt-hole circle.

The following topics are covered:

- Objects
- Indicating Selection Preferences
- Selection Process
- Eye Dropper tool

Objects

A single piece of geometry is an object.

_____ **Single Object**

A line is an object

Several objects that have been grouped with the *Group* command are also an object and are selected when you click on any member in that group.

A point is an object, too. Every type of geometry contains one or more points, some-

Unselected point   Selected point

A line without points displayed   A line with points displayed

times called *control points*. A line has two control points, one at the beginning and one at the end of the line. If you select an object and choose *Edit>Show Points*, the points are visible on the selected object. If you select a point without selecting the geometry it defines, Your Designer Elements program treats the point as an object.

Indicating Selection & Preferences

When you select an object, its appearance on the screen shows that it is selected in a specific color. The default color chosen is red for your Designer Elements program. You can choose you own color as well as choose other settings for selecting objects by choosing *File>Preferences>Select*. The following selection page is displayed.
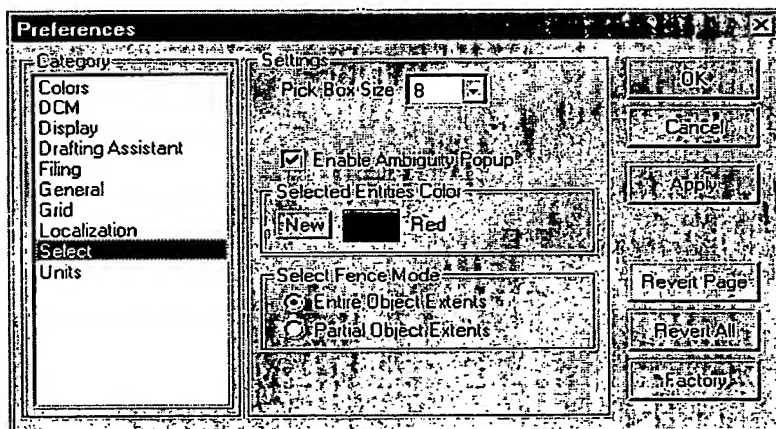
Pick Box

The pick box is an invisible box centered about the pointer tip. The default size of the box is 8 x 8 pixels. The pick box requires you to move the pointer over the desired object and click the mouse button. Objects that are within the bounds of the pick box are selected. See the graphic below.

Invisible Pick Box
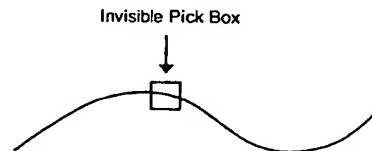
Select Fence

The selection fence is a rubber banding selection window. You can choose between one of two settings, *Entire Object Extents* or *Partial Object Extents.*

Entire Object Extents

Only objects that lie completely within the pick window are selected. In the graphic below, only the circle is selected.

Drag the mouse from one point...

To another and release.
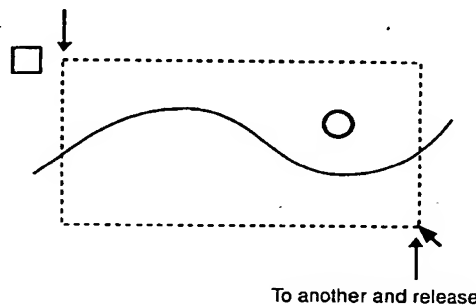
Partial Object Extents

Any object that lies within the selection fence window is selected. In the graphic above, both the circle and the spline are selected.

Selection Color

You can choose any color for the selection color. In the *Selected Entities Color* section, click New and your standard color display appears. Choose the color, click OK and you are returned to the *Select* page of the Preferences display. Once the selection color changes, all current and future selected items appear in the new color.

4-3

Do not use black for indicating selection because black is the default color for all curves.

Selection Process

Selecting an object does not affect the properties of the object. A selected object highlights, but this highlighting goes away once the object is deselected. You can select an object by using either the **Selection** tool or by the hollow selection tool that appears temporarily when using one of the editing tools.

You can use the **Selection** tool to select both objects and points. While the selection process for objects and points are quite similar, there is enough difference to merit separate attention.

Selecting Objects with the Selection Tool

To select an object, begin by clicking the **Selection** tool in the main tool palette. You can select one object, SHIFT-click more than one object, or drag a selection fence around a group of objects.

Selection Tool

The **Selection** tool in the main tool palette selects one or more objects (curves, solid edges, faces, etc.) or points in the drawing area. The graphic here shows the selection of a solid face.

You can use the **Selection** tool to edit previously created geometry. Click on the object to be edited and use the **Status Line** to edit the parameters of the object.
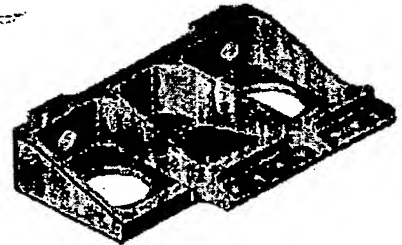
Tip:
Having trouble selecting objects when displaying many objects? Try using the Selection Mask, a selection fence, or rotate the view slightly and try again.

Selecting a Single Object

1. Click the **Selection** tool in the tool palette. The Message Line reads: *Selection: Select [Shift=Extend, Ctrl* (Windows) or *Option* (Macintosh) *= Copy]*.

2. Move the pointer to an object and click. The object is selected, and any previously selected objects are deselected.

Double-selecting a Single Object

Double-click on an object to display an Object's characteristics. This will bring up the Edit objects dialog box. You can also make changes to the object through this box. See Chapter 24 for more information.
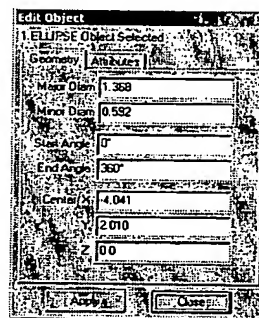
Selecting Multiple Objects by SHIFT-clicking

1. Choose the **Selection** tool in the tool palette.

2. Move the pointer to an object and click.

3. Press down the SHIFT key.

4. While holding down the SHIFT key, click other objects to be selected.

   The objects you clicked are selected. If you then click one of the selected objects, it is deselected.

5. Release the SHIFT key.

Selecting Multiple Objects by Dragging

If you want to select more than one object, you can drag a selection fence around the objects.

1. Click the **Selection** tool in the tool palette.

2. Drag a selection fence around the objects you want to select.

If you want to select most of the objects within an area, you can drag a selection fence to select all the objects, and then deselect the objects you do not want by holding down the SHIFT key and clicking them.

Selecting One or More Objects when they Overlap (Ambiguity Popup box)

Often times with more complex drawings, geometry overlaps to such an extent that it's difficult to select one object without zooming very close to it. This Designer Elements program has made this easier with the Ambiguity Popup box. When you attempt to select one object among many objects close together, the popup menu appears.
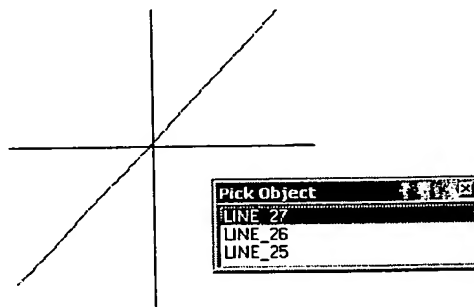
As you move the pointer over an object name in the popup, the object it represents highlights in the selection color but is not yet selected. Click on the object name in the popup to accept that choice. If you move the pointer beyond the extents of the popup window, the window will automatically move, enabling you to see what is underneath the window.

The Ambiguity Popup box lists faces for such tools that require the selection of a face (draft, shell, fillet and extrude).

You can select only one object at a time in the popup box.

You have two options for closing the Ambiguity box without selecting an object:

- Click the Close button or box in the title bar

- Click outside the popup box

Selecting All Objects

There are two ways to select everything in the your Designer Elements program document.

- Select the **Selection** tool and choose *Edit>Select All* (CTRL+A (Windows) or z +A (Macintosh).

- Double-click the **Selection** tool.

Copying with the Selection Tool

The **Selection** tool can be used to copy wireframe, surface and solid objects. Be careful when copying surfaces and solids. By holding down the CTRL (Windows) or OPTION (Macintosh) key and dragging a surface or solid you create an instance of the original object. All changes made to the original object are automatically reflected in the instance (Cobalt™ and Xenon™ only). If you do not want to create an instance, select the original object, choose *Edit>Copy* and then *Edit>Paste*.

Selecting Points

Selecting points differs from selecting objects because points are not always visible.

Being able to select points is useful in two situations: stretching selected geometry (described later in this chapter) and control point selection for transformations.

Show/Hide Points Command

This command in the Edit menu toggles the display of the *control points* (*endpoints, midpoints, center* points and *vertex* points) for selected objects. When points are displayed, you can select a point by clicking it. If points are not displayed, you can select a point by dragging a selection fence around the location of the point.

To show points for an individual selection, choose *Window>Edit Objects* and change the control points setting from Hidden to Visible.

Unselected point   Selected point

A line without points displayed   A line with points displayed
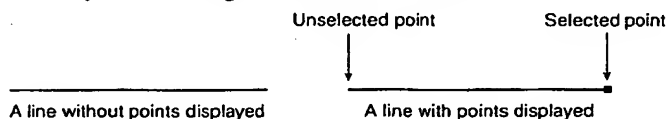
If you select and drag a line, the line and the endpoints move. If you select and drag only an endpoint of the line, the endpoint moves and the line length changes while the other endpoint of the line remains fixed.

The appearance of a selected point is not affected by the zoom scale or the line width of your geometry.

Displaying Points

1. Select the geometry.

2. Choose *Edit>Show/Hide Points* to toggle the display of points on and off.

To turn off the point display once the points of an object are showing, you must select the object again and choose either *Edit> Hide Points* or the *Control Points* option in the Edit Objects dialog box. The graphic illustrates some curves with their associated points.
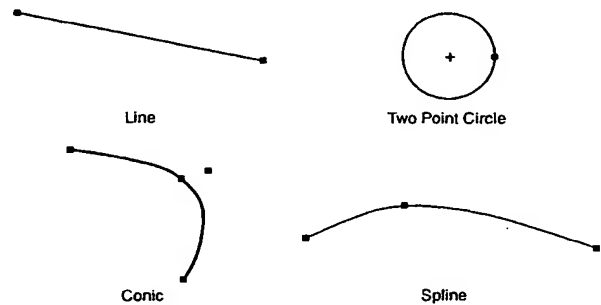
Showing and Hiding Points with Stroke

When you hold down the SHIFT+CTRL keys (Windows) or the z key (Macintosh) and click an object, the display of the object's points toggles on or off. If the points are hidden when you click the object, the points display.

Selecting Points

You can select a control point whether the points are visible or not. To select points:

1. Chose the **Selection** tool.

2. Drag a selection fence around the location of the point.

   The selected point displays as a square.

Selectable Points Command

This command in the Edit menu gives you the ability to select points that aren't displayed. When *Selectable Points* is not set, you cannot select points by dragging a fence.

If points are displayed, click the point to select it. If points are not displayed, you can select a point by dragging a selection fence around it. The following example illustrates the use of *Selectable Points.*

The line's control point is selected with the rectangle →

With Selectable Points turned on, the Move tool moves the lower rectangle and the line endpoint

The line's control point is not selected with the rectangle →

With Selectable Points turned off, the Move tool moves the lower rectangle but not the line endpoint
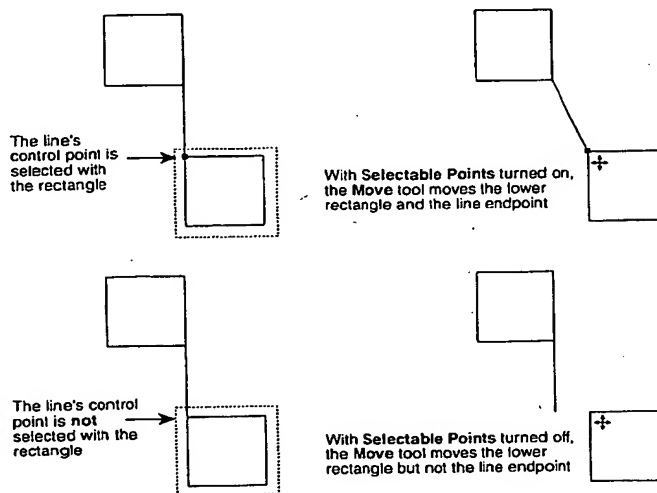
Selecting Objects using Other Tools

With the editing tools, you will be asked to select the objects for performing an operation. As was mentioned earlier in the chapter, you select the tool first and then the objects.

When you select the tool and move the pointer into the drawing area, it becomes a hollow selection arrow.

When you finish selecting, the pointer becomes a general tool cursor.

This outline arrow must not be confused with the **Selection** tool.

Selecting Objects with Commands

Your Designer Elements program provides you with three selection commands, *Select All, Selection Mask* and *Select Chain.*

Select All - CTRL+A (Windows); z +A (Macintosh)

When the **Selection** tool is chosen, this command in the Edit menu selects all objects except those on a hidden layer or excluded by the Selection Mask. You can also double-click the **Selection** tool to select all objects.

Select Mask Command

This command in the Window menu allows you to limit selection by object type, layer and color. You can only select objects that are highlighted in the dialog box. The object type list includes such things as points, lines, splines, mesh, surfaces, solids, text, dimensions, images, symbols, groups, lights, decals, draw view, cross hatch, etc.

For example, if circles are not highlighted, when you choose *Select All*, everything but the circles is selected. In this way, you can select such combinations as only blue splines or only red objects on a particular layer.

Using the Selection Mask

1. Choose *Window>Select Mask*.

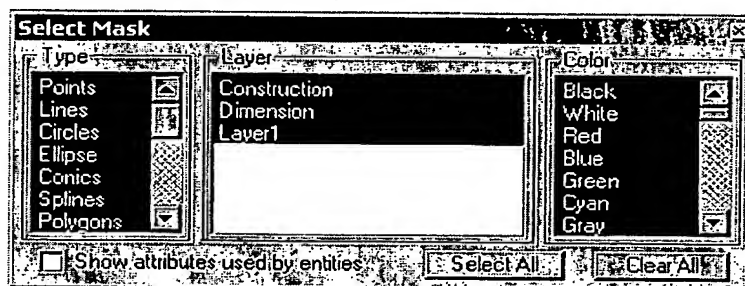   The Selection Mask dialog box appears.

Tech Note:

Vellum 3D Users: In Vellum 3D when you closed the Selection Mask, the setting remained in effect until you selected another creation tool.

Select Mask
Type	Layer	Color
Points	Construction	Black
Lines	Dimension	White
Circles	Layer1	Red
Ellipse		Blue
Conics		Green
Splines		Cyan
Polygons		Gray
Show attributes used by entities	Select All	Clear All

The highlighted items respond to all selection methods and can be detected by the Drafting Assistant.

2. Click the items you want to be able to select so they are highlighted.

While the dialog box is visible, you can select, create and edit geometry. You can move the dialog box if it covers geometry you want to work on. The Selection Mask resets itself to the default setting of *Select All* after you close the box.

When an item in the dialog box is not highlighted, the Drafting Assistant and all the tools cannot detect it, even though it is visible to you on the screen.

The Selection Mask is useful when you have created a complex drawing and want to change particular groups of objects. You can use this feature to export some but not all geometry.

If layers are added when the Selection Mask dialog box is displayed, the Selection Mask dialog box automatically updates.

Selecting or Deselecting Listed Items

- To select one item - *Windows*: With all items selected, click on the item and the rest of the list will be deselected. *Macintosh*: Press the Clear All button and click on the desired item.

- To deselect a list quickly, press the Clear All button.

- To select a contiguous group of items, click on the item at the top or bottom of the desired group list and drag up or down to select the other items in the group.

- To select or deselect non-contiguous items, hold down the CTRL (Windows) or the z key (Macintosh) and click on the items.

Select Chain Command

This command selects curves that are connected to the selected object. To use the *Select Chain* command:

1. Select the beginning of a curve as shown by the arrow in the left graphic below.

2. Choose *Edit>Select Chain*.

3. All objects connected to the start or end are selected, as in the right graphic below.

Deselecting

To deselect an object, click anywhere in the drawing area where there is no object, or click any of the creation tools in the tool palette.

You can deselect an object that was selected in a multiple selection operation. While the objects are still selected, hold down the SHIFT key and click the objects you want deselected.

Eye Dropper Tool

This tool allows you to copy object characteristics such as line font, color, pattern, arrow at start and end and render materials from one object to another.

You can specify which object characteristic you want to copy through the Eye Dropper Filter dialog box. To display this box, press the CTRL (Windows) or OPTION (Macintosh) key.

The listed characteristics include: line font, color, layer and render material.

This tool does not affect the resolution, dimensions, iso lines or the size and shape of the object. In the graphic below, the left block characteristics were applied the cylinder with no material applied to it (middle graphic). The right graphic shows the cylinder with the same render material as the block after using this tool.
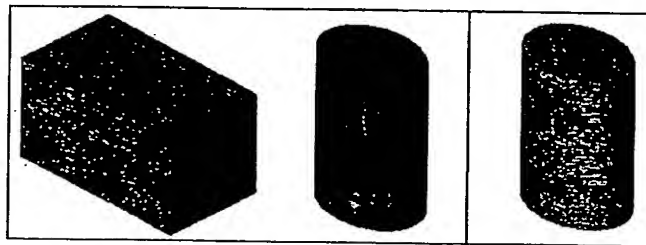
Using the Eye Dropper Tool

1. Select the **Eye Dropper** tool from the **Selection** tools palette. The Message Line reads: *Eye Dropper: Select objects to modify [Shift=Extend].*

2. Select the objects whose characteristics you want to change.

   The Message Line now reads, *Eye Dropper: Select object to copy from [Shift=Extend, Ctrl* (Windows) or *Option* (Macintosh) *= Filter].*

3. If you do not want all object characteristics copied, press the CTRL (Windows) or OPTION (Macintosh) key to display the Eye Dropper Filter dialog box. Otherwise, skip to next step 5.

4. Deselect those items in the dialog box that you do not want copied.

5. Select the object whose characteristics you want to copy.

The object's characteristics change to those of the referenced object.

You can also select the object before you select the tool. If you do this, you only select the reference entity and the object automatically changes. If the change involves applying a material, render your drawing to confirm the change.

There are no Status Line entries.

Selecting Objects

Pen Settings

This chapter describes various options for adapting your Designer Elements program to your needs.

Default versus Selected Object Settings

When no object is selected, any changes made to the settings become the default for all open files. When an object is selected, any change made will only affect the object.

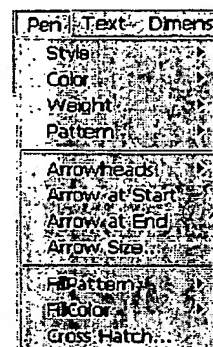The following topics are covered:

- Style
- Color
- Weight
- Pattern

• Arrowheads

You have three options for setting pen characteristics, pen color, weight and pattern.

You can change the pen characteristics for selected objects or choose one or more of these characteristics as the default setting for your file.

Changing the Pen Characteristics of an Object

1. Select the object.

2. Choose *Pen>Color*, Weight or Pattern and select the one you want for the selected object.

    This change only affects the selected objects. It does not affect the default setting for future objects created.

Changing the Default Pen Characteristics

If you want to change a pen characteristic so that all future objects will have that characteristic, choose the characteristic without having any object selected.

Style

The *Pen>Style* menu contains commands for creating and modifying pen styles. A pen style is a collection of pen attributes such as color, weight and pattern.

Pen Styles are associative. This means that after you create and assign pen styles to a drawing you can go back and modify the pen style and have all objects using that pen style update.

The first three menu option provide tools to create, delete and modify user defined pen styles. The next nine pen styles are hard coded into the program and therefore not modifiable.
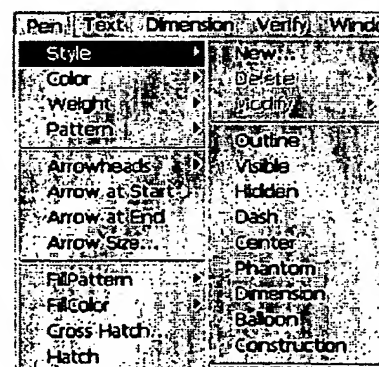
Creating a new Pen Style

To create a new pen style choose *Pen>Style>New* from the
drop down menu. Specify the name, color, weight, pattern and
scale, clicking "Ok" creates the new style. All pen styles that
you create are listed below the non modifiable pen styles.
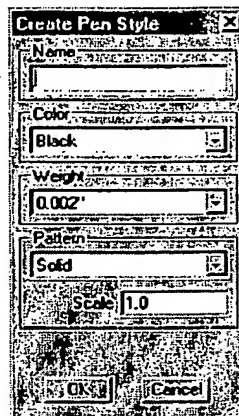
Deleting a Pen Style

To delete a pen style choose *Pen>Style>Delete* from the drop
down menu and choose one of the styles you created. The non
modifiable pen styles cannot be deleted.

Modifying a Pen Style

To modify a pen style choose *Pen>Style>Modify* from the drop
down menu. This provides you the means to change one of the
pen styles you created. Hit "Apply" for your changes to take
effect.

Color

There are 256 color options including 239 user definable colors and 17 predefined colors. Each definable color can be assigned independently from the 16.7 million colors available.

The color submenu displays eight of the defined colors by name, including black, white, red, yellow, green, cyan, blue and magenta. The submenu also includes the option, More which displays a color palette with more color options.
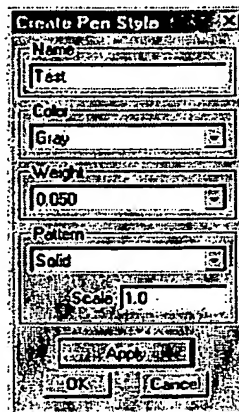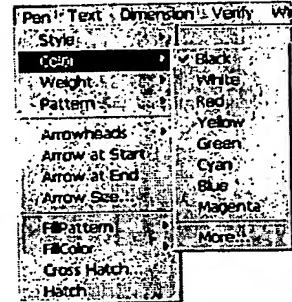
Tip:
The fill color for polygons is set in the Pen Color. See Chapter 28.

Displaying the Color Palette

1. Choose *Pen>Color>More.*

    The Color palette appears.

2. You can choose to display 8, 16, 144 or the full 256 color palette. The default color palette displays 256 colors. Click the button in the upper right corner of the title bar.

    You can cycle through the number of colors displayed by continuing to click the same button.
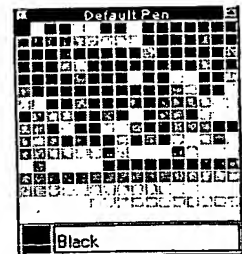
Specifying the Color of the Current Pen

1. Choose *Pen>Color.* The submenu appears.

2. Choose the color you want.

    The pen takes on the new color, selected in the submenu.

This Color command specifies the color of the current pen and any other selected geometry without changing any other pen characteristics.

Defining Colors

You can define as many as 239 colors. When you define a color, you are defining it both for the file and for your Designer Elements program.

Because the color displays are different for Windows and Macintosh machines, the process for defining a color varies slightly.

Windows:

1. To define a new color, choose *Pen>Color>More.* The color palette displays.

2. Double-click on one of the definable colors.

   The first 17 are not definable. If you attempt to redefine one of those you receive the following error message.
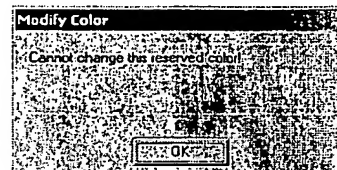
   If the color is definable, the following color display appears.

3. Click the Define Custom Colors button to display the full color display.
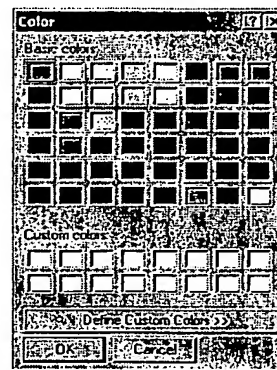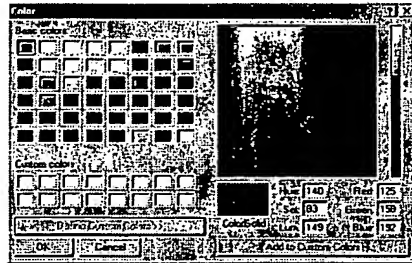
The color display contains the following elements:

Basic Colors	This section displays the 64 default colors available in the palette.
Custom Colors	You can display 16 more user-defined colors in this area for a particular file. These will be saved with the particular file but will not save as a default setting.
Add to Custom Colors	Use this button to place a color in the Custom colors section.
Color Palette	Select your color by using this palette.
Color Palette Solid	Once you select a color, it appears in this swatch.
Hue, Saturation, Luminance	These fields automatically fill in when you select a color. You can also enter values into these fields.
Define Custom Colors	Click on this button when you see a partial color display to show the full color display.

Red, Green, Blue	These fields automatically fill in when you select a color. You can also enter values into these fields.
Cancel, OK	Click Cancel to close the color display without saving the color selection. Click OK to accept the color selection.

4. In the color palette on the right, place the pointer within the target cursor and drag to the color desired. The color displays in the Color/Solid area below the palette.

   You can also adjust the Hue, Saturation, Luminance, and the percentage of Red, Green and Blue by entering your own values. The % of black can be adjusted by moving the cursor over the arrow in the scroll bar to the right of the color palette and drag up or down to the desired location. All the values in the Luminance, Red, Green and Blue data fields change as well. Hue and Saturation do not change.

5. Once you have chosen the color, click OK, the color display closes and you are returned to color palette.

6. Double-click on the color name field, where the old name currently displays. The following dialog box appears.
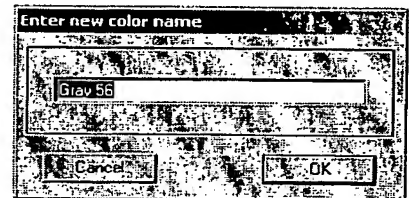
7. Enter the new name for the color and click OK.

   You are returned to the color palette with the new color name shown.

8. Repeat this process to define up to 239 colors.

These colors save with the file and the program for future use.

Macintosh:

1. To define a new color, choose *Pen>Color>More*. The color palette displays.

.2. Double-click on one of the definable colors.

The first 17 are not definable. If you attempt to redefine one of those you receive the following error message.
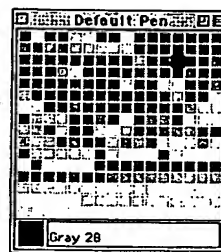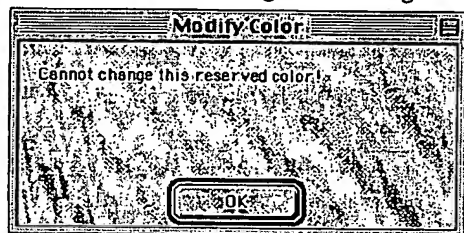
If you click a definable color, one of six color displays appears: HLS Picker, HSV Picker, CYMK Picker, Crayon Picker, HTML Picker or the RGB Picker. You have a choice for the default display.

HLS Picker
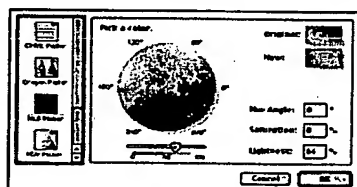
HSV Picker
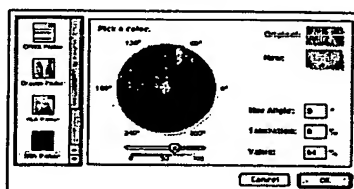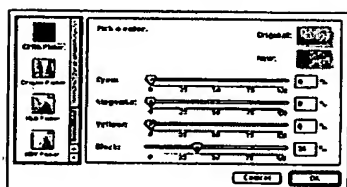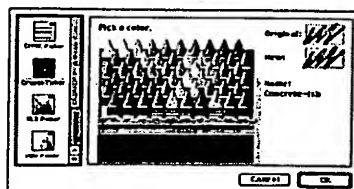
CYMK Picker

Crayon Picker
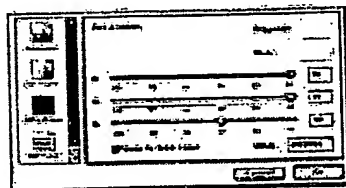
HTML Picker   RGB Picker
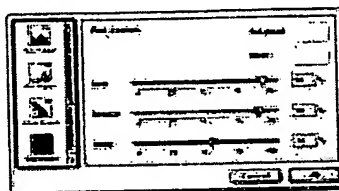
The *HLS Picker, HSV Picker, CYMK Picker, Crayon Picker, HTML Picker and RGB Picker* contain the following elements:

Color Wheel (HLS & HSV) Contains the color spectrum from which you choose a color. Click or drag within the wheel to select the color. The color values appear in the Hue and Saturation data fields.

Lightness Slide Bar (HLS & HSV) Allows you to set the lightness for a particular color. Place the cursor over the slide and drag to the desired lightness. The lightness value appears in the data field.

Hue Angle, Saturation Lightness fields (HLS & HSV) Values can be entered into these fields to select a color.

Color Slide Bar (RGB) There are three bars; Red, Green and Blue. Place the cursor over the slide and drag it to adjust the color value for each bar. Values are entered in the data field.

Red, Green and Blue (RGB) Values can be entered into these fields to select a color.

Name (Crayon) The color name displays when you choose a crayon color.

Crayon Box (Crayon) Displays the colors available for selecting.

More Choices/Fewer Choices This toggles between the two options. Choosing More Choices displays two icons for the HLS Picker, HSV Picker, CYMK Picker or Crayon Picker displays. Choosing Fewer Options turns off the icon display.

Original/New fields Original displays the current color setting for the color you are defining. When you define a new color, the

swatch is gray. New displays the new color you have selected.

Cancel, OK   Click Cancel to close the color display without saving the color selection. Click OK to close the dialog box and save the new settings.

3. Choose a color from the color display.

4. Once you have chosen the color, click OK, the color display closes and you are returned to the color palette.

5. Double-click on the color name field, where the old name currently displays. The following dialog box appears.

Enter new color name

Gray 48

Cancel   OK

---
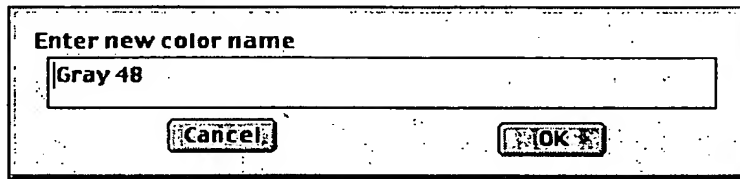
6. Enter the new name for the color and click OK.

You are returned to the color palette with the new color name shown.

7. Repeat this process to define up to 239 colors.

These colors save with the file and the program for future use.

Add to Custom Colors (Windows only)

This feature is standard for the Windows platform and allows the user to save 16 user-defined colors for a particular file and display in the Custom colors section of the Color display when you first double-click on a definable color.

1. Repeat steps 1 and 2 in the previous section, "Defining Colors," to show the partial color display.

2. Place the pointer over one of the available boxes in the Custom colors area and click. A dotted line appears around that box to show that it is selected.

3. Click Define Custom Colors and the full color display appears.
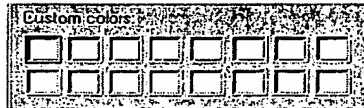
Note in the display that the Color/Solid area is black and the target icon in the palette

above it is at the bottom edge.

4. Move the pointer to the color palette and place it within the target area. Drag this to the color you desire. You can also adjust the % of black in the color by dragging the arrow, in the scroll bar to the right, to the desired location.

5. Click Add to Custom Colors. The color appears in the Custom colors patch.

6. To fill in the others boxes, go through the same process.
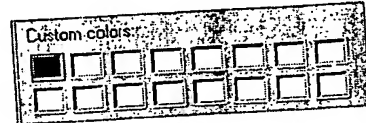
Weight

This command in the Pen menu sets the pen width of the current pen pattern and selected lines without changing any other pen characteristics.

You also have the option of setting a line weight based on units, pixel thickness and through the More option by the point size or model space.

Units

The line weights shown depend on the units selected in the Preferences dialog box. If you have selected metric units, the line weight shows in millimeters instead of inches.

Pixels

The pixel weight depends on the screen resolution and so remains constant from zoom to zoom.

More

When you choose More, the Pen Weight dialog box appears.

By selecting the Points, you can enter a value in the size field of the point size you want for the current pen weight. By selecting the Model, you can enter a thickness value based on the units of your model set in the Preferences dialog box. A one inch value entered in the field, prints one inch thick, for a drawing scale of 1:1. After you choose your setting, click OK to accept the pen weight or Cancel to close the More dialog box.

Note: Any line thickness of less than .016 inch appears one pixel wide on the screen. When you print or plot such lines, you can see the different weights.
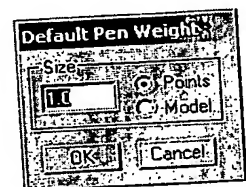
Specifying a New Weight for the Current Pen

1. Choose *Pen>Weight*. The submenu appears.

2. Drag to the weight you want.

   The pen takes on the new weight, selected in the submenu.

Pattern

The pen pattern determines the appearance of lines on the screen and during plotting. Any line thickness of less than .016 inch appears one pixel wide on the screen. When you print or plot such lines, you can see the different weights.

The default pen pattern is Solid. The default color for all patterns is black. The default weight for all patterns is 1 pixel.

There are nine default pen patterns in the Pattern submenu of the Pen menu.
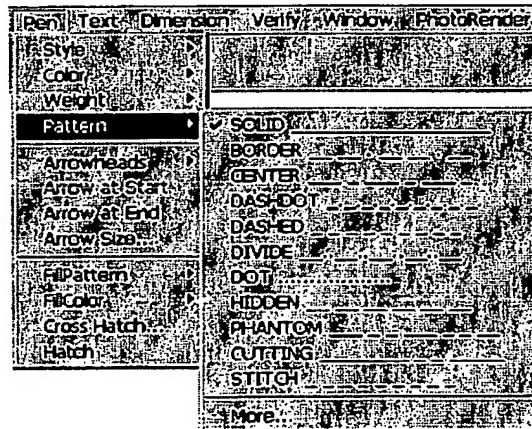
You can also create your own pen patterns and access them through the Line Pattern dialog box by choosing *Pen>Pattern>More*.

Line Pattern Manager

The Line Pattern manager appears when you choose *Pen>Pattern> More*. If nothing is selected the dialog box is called Default Line Pattern and the pattern becomes the default pattern for the drawing. If an object is selected the dialog box is called Object Line Pattern and the pattern selected only applies to the selected object. Both dialog boxes display the pen patterns that are available to you for creating and editing geometry. You can perform some basic editing on these patterns using the options provided.

The Line Pattern manager contains the following items:

Patterns

Scale
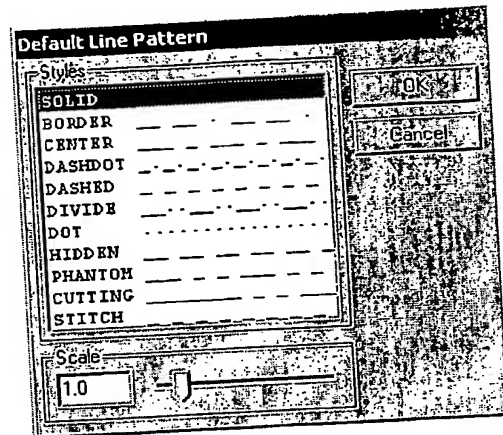
This section contains all the patterns available.

This field contains the value by which the pattern dashes and spaces are multiplied to obtain the same pattern at a different size. You can either enter a specific value or use the slide to set the scale. The graphic below is an example of the phantom line with scale values of 1, 2 and 3.

(Scale 1) _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

(Scale 2) _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

(Scale 3) _ _ _ _ _ _ _ _ _ _

New Patterns

Each line pattern displays according to two description lines of the Cadd.lin file in the Environ folder.

```
;;
;;          Version 1.0 - CSI-CADD Linetype File
;;
;;          Date    6/12/95
;;
;;          Line font descripters using the AutoCAD ACAD.LIN format
;;
;;
BORDER,___ __ . __ ___ . __ ___ . — — · — — — · — — — · — —
A,.25,-.125,.25,-.125,0,-.125
CENTER,___ _ ___ _ ___ — — - — — - — — - — — - — — - — — -
A,.75,-.125,.125,-.125
```

You can add new patterns to your Designer Elements program by opening the file in an ASCII text editor and creating two new description lines per pattern.

The first line contains the pattern line name plus a descriptor string. The second line contains the length attribute for dashes, spaces and dots. A zero (0) value indicates a dot and a negative value indicates a blank space.

Creating a New Pattern

1. Quit your Designer Elements program, if it is running.

2. Open the Cadd.lin file from the Environ folder in an ASCII text editor.

3. After the last line pattern, enter the name of your new pattern. Give it a name not already used.

4. In the same line, enter a descriptor string. This string is simply a visual representation of the pattern that will display in the Line Pattern Manager next to the name. (See the other patterns for an example). Use the periods, dashes and the space key on your keyboard to create the descriptor.

5. Begin the second line with a capital "A" followed by the length of the attributes. Each attribute should be followed by a comma and contain no spaces.

6. Save the file.

7. Restart your Designer Elements program.

Editing Patterns

You can edit any pattern in two ways:

• Make changes to the Cadd.lin file in an ASCII editor.

- Choose settings in the Line Pattern Manager.

Making Changes in the Cadd.lin file

1. Quit your Designer Elements program, if it is running.

2. Open the Cadd.lin file, from the Environ folder, in an ASCII text editor.

3. Make the desired changes to the patterns. If you have changed a default pattern, name or descriptor, it will be reflected in the Pattern submenu.

4. Save the file.

5. Restart your Designer Elements program.

Choosing Settings in the Line Pattern Manager

1. Choose *Pen>Pattern>More*. The Line Pattern Manager displays.

2. Select the pattern you want to modify.

3. Enter a value in the Scale field.

4. Click OK to accept the changes or Cancel to close the Line Pattern Manager. All selected will reflect the changes.

   If any objects are selected, they will reflect the changes. The current pen pattern will not be affected unless it's the pattern you changed.

   If no objects are selected, clicking OK will change the current pen pattern to the edited pattern.

   Important: Changes made here affect all open files.

Specifying a New Pattern for the Current Pen

1. Choose *Pen>Pattern*. The submenu appears.

2. Drag to the pattern you want. The pen takes on the new pattern, selected in the submenu.

Specifying a New Pattern for a Selected Object

1. Select the object.

2. Choose *Pen>Pattern*.

3. Drag to the pattern you want. The pen takes on the new pattern, selected in the submenu.

Construction Line Pattern

A construction line uses a dotted line pattern. It cannot be modified and is not affected by changes to the dot pattern. The default color is magenta. If you want to create construction geometry on the construction layer, you can use the dotted line pattern.

Arrowheads

When you want to use arrowheads on lines or circular arcs that are not a part of dimensions, specify the placement of arrowheads in the Pen menu. You can have an arrowhead at the beginning or end of a line or circular arc, or at both the beginning and end.
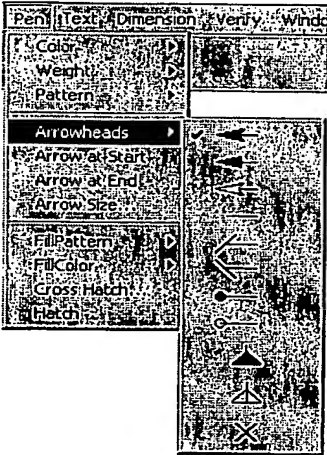
Arrowheads Type

The Arrowheads submenu allows you to choose one of eight arrowheads for arrow lines. Select the style that you prefer.
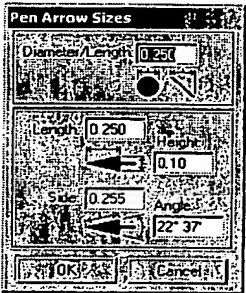
Arrow Size Command

This command in the Dimension menu lets you specify the size of the arrowhead that you have selected.

Diameter/Length	This value is the diameter or length of circular and length of all slash or standard arrow styles. The value here affects all Length, Side and Angle fields. The value displays in the current units specified in the Units page of the Preferences dialog box.
Length	This value is the length of the arrowhead as the horizontal distance from its tip to the furthest extension of its base.
Height	This value is the height of the arrowhead as the vertical distance of its base.
Side	This value is the length of the edge of the arrowhead.
Angle	This value is the angle of the tip of the arrowhead.

If you change any value in the Length, Height, Side, or Angle entry fields, this Designer Elements program changes the values in the other entry fields accordingly.

Arrow At Start

This command in the Pen menu places an arrowhead at the beginning of selected and subsequent lines and circular arcs. You can choose the type of arrowhead from the Pen menu. A check indicates the current arrowhead setting. You can change the default setting by saving changes in the preferences file.

Arrow At End

This command in the Pen menu places an arrowhead at the end of selected and subsequent lines and circular arcs. You can choose the type of arrowhead from the Pen menu. A check indicates the current arrowhead setting. You can change the default setting by saving changes in the preferences file.

No Arrow At Start	———	**No Arrow At End**
Arrow At Start	◁———	**No Arrow At End**
No Arrow At Start	———▷	**Arrow At End**
Arrow At Start	◁———▷	**Arrow At End**

The start and end of a line and an arc are determined by the point that was created first.

Preference Settings

All designers develop a particular style when creating their models and parts. This style includes specific standards that unify their work and may include such things as measurement units, line color, drawing layout, short cut keys and more. It also unifies work within companies and industries. Preferences set in the Preferences dialog box relating to object display and creation affect only the entities created after the preference is set.

Default versus Selected Object Settings

When no object is selected, any setting changes made to *Selectable Points, Grid, Axis, Triad, Show Points, Construction Lines, User-defined* plane, *Pen, Text, Dimension,* tool palettes and *Render* become the default for all open files and the current Designer Elements program session. When an object is selected, any change made will only affect the object.

This chapter covers the following topics:

- Preferences

- Short Cuts

Preferences

Your Designer Elements program allows you to save preferences for a particular session. However our program do not support saving preferences with a specific file.

When you have more than one file open during a particular Designer Elements program session, menu settings like pen pattern, *Hide/Show Axis* and the status and location of palettes are the same for all open files. Commands dealing with the view orientation and work plane are file specific.
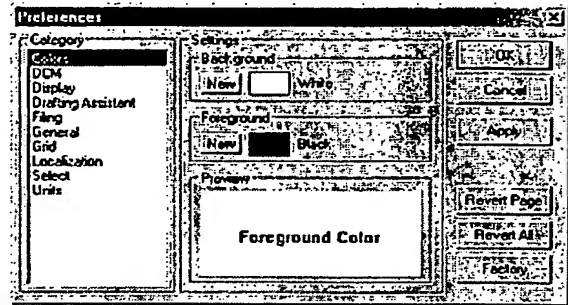
To save preferences, choose *File>Preferences* to display the dialog box. Preferences are saved in *prefs.ini*.

The Preferences dialog box contains a *Category* list of Preference groups, the *Settings* section and a series of operation buttons. The buttons include:

OK	Saves preference settings you have specified in this session and closes the Preferences dialog box.
Cancel	Closes the dialog box without saving all changes.
Apply	Applies the change instantly.
Revert Page	Undoes changes made to the current preference group.
Revert All	Undoes changes made to any preference group.
Factory	Resets all preference groups to the factory settings.

The *Category* list includes:

• Colors

• DCM

• Display

• Drafting Assistant

• Filing

• General

• Grid

• Localization

- Select

- Units

Selecting an item from the *Category* list displays its preference options in the *Settings* section.

Colors

Choosing the Color category displays the Color preferences page. This page controls the foreground and background color of the drawing area. The current (or proposed) settings are indicated by the color rectangle, color name and the *Preview* section. Press the appropriate New button to display the color selection dialog box and change the color.
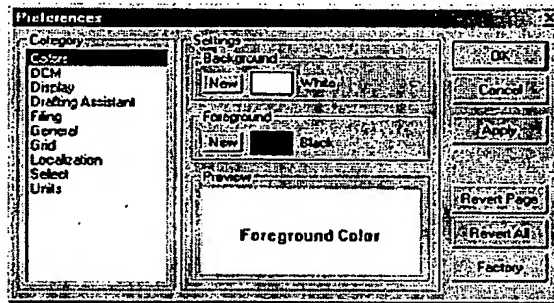
Background

This setting allows you to set the background color for your drawing area. The current color is displayed in the window.

1. Click New. The color palette is displayed.

2. Choose the background color.

3. Click OK. The new background displays in the view window with the color name. For colors other than the standard colors, the color values display to the right of the view window.

Foreground

This setting allows you to set the foreground color for your drawing area (specifically the location indicator and the indicator separator lines). The current color is displayed in the window.

1. Click New. The color palette is displayed.

2. Choose the foreground color.

3. Click OK. The new foreground displays in the view window with the color name. For colors other than the standard colors, the color values display to the right of the view window.

Preview

The Preview window displays your background and foreground choices.

Dimensional Constraint Manager (DCM) (Cobalt™ Only)
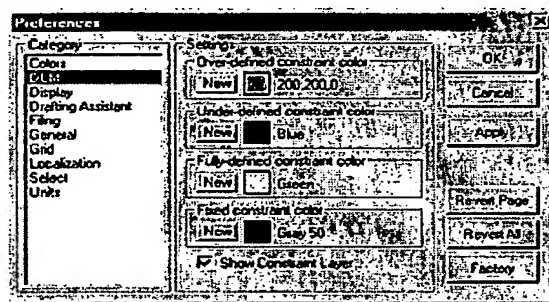
This option controls how the Dimensional Constraints Manager gives feed back to the user.

Over-Defined Constraint Color

You have the ability to set the color of an over-defined sketch. Set this field to the desired color.

Under-Defined Constraint Color

You have the ability to set the color or an under-defined sketch. Set the field to the desired color.

Fully-Defined Constraint Color

You have the ability to set the color of a sketch that is fully defined. Set this field to the desired color.

Fixed Constraint Color

You have the ability to set the color of fixed constraints. Set this field to the desired color.

Show Constraint Layer

This check box tells the program whether or not to show constraints as they are being applied. If the box is not checked, constraints will be visible on the active work layer even though the constraints are being applied.

Display

This option controls the individual default display parameters for curve, surface and solid object types.
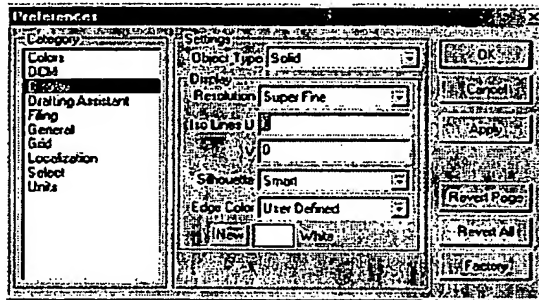
Object Type

You have the ability to set the appearance of Curves, Surfaces and Solids. Each object type offers different display options.
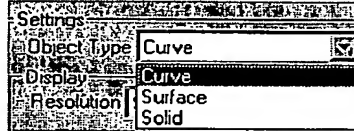
Display

For each object type (curve surface and solid), you can choose a display option. Display options vary according to the object type and may include: *Resolution, Iso Lines, Silhouette* and *Edge Color.*

Resolution

(Available for all object types) Controls how accurately an object's curves appear. You can set the curve resolution to Coarse, Medium, Fine, Very Fine and Super Fine. An object with a Coarse resolution draws quickly but may be visually less appealing. An object with a Fine resolution draws more slowly but may be visually more appealing.

Iso Lines

(Available for Surface and Solid object types) *Iso* (isopram) *Lines* control the number of U and V lines displayed for a surface or solid object. Iso Lines are constant parameter curves that lie on an object. U and V are letters used to define these lines (and their coordinates) in parameter space where U is for horizontal and V is for vertical. These are standard for the industry. A zero (0) in both fields turns off Iso Lines. U/V values may enhance the visual appearance of a surface or solid at the expense of drawing speed.

The left graphic below shows a surface with both U and V Iso lines set to five (5).

Tech Note:

Parameter space is where objects are defined in a 2D coordinate system. Typically, a surface is mathematically defined in parameter space. Each surface has a mathematical function that maps 2D parameter space into 3D model space. A U/V coordinate of U=0.5 and V=0.25 in parameter space maps to X=100, Y=300, Z=255 in 3D model space.
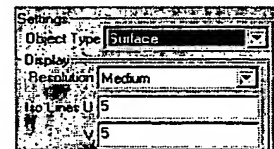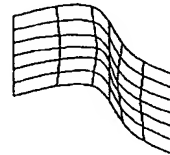
Silhouette

(Available for Surface and Solid object types) Controls the silhouette edge draw mode. There are three options, Off, On and Smart. Silhouette edges are view dependent and can cause a significant reduction in drawing speed. If the Smart mode is selected, silhouettes will be dynamically drawn based on performance considerations.
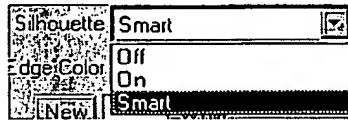
Edge Color

(Available for Surface and Solid object types) This option allows you to set the edge color of rendered mesh objects separate from the entity itself.
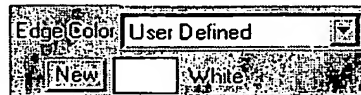
You can select one of four options from the pull-down menu, Foreground, Background, Entity and User Defined. To specify a User Defined color, click on New, choose a color in the palette and click OK. The new color is displayed in the Edge Color window with its RGB values.

Drafting Assistant

This category controls the low level snapping behavior of the Drafting Assistant. The settings include the *Hit Radius, Alignment Angles, Creation Angles* and *% Point.*
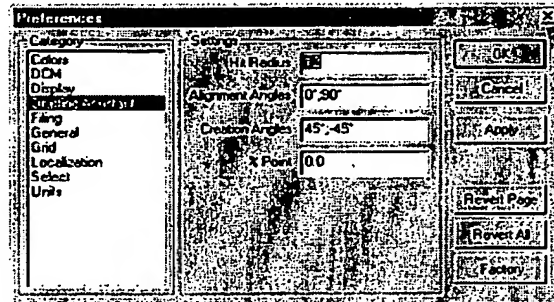
Hit Radius

Determines the detection distance in pixels. When the pointer is within the specified *Hit Radius*, the

Drafting Assistant notations display and the object is selected when you click the mouse.

Alignment Angles

Define angles for the Drafting Assistant's dynamic construction lines. If you want to change the orientation of your drawing, you can change these specifications. For example, in a 2D drawing, you could set these angles to 30°, 90° and 15° for isometric drawing. The defaults are 0° (horizontal) and 90° (vertical). Values should be separated by semicolons.

To display a dynamic construction line through a point, move the pointer to the point to activate it (a diamond appears); construction lines automatically display through the active point. You can have as many as eight active points. When you activate the ninth point, the first one in the series deactivates.

Creation Angles

Define angles for Draft Assistant dynamic construction lines displayed when you are creating geometry. (These lines are not part of the list of lines generated from the eight active points.) The defaults are +45° and -45°. Values should be separated by semicolons.

% Point

Controls the Drafting Assistant's notations for divisions of a curve. For example, entering 25 instructs the Drafting Assistant to tell you when the pointer is 25% of the distance along a line.

Filing

This category controls the filing behavior of your Designer Elements program. Settings include *Save Native Picture Formats Only, Compact Files, Read-only Network File Sharing, Recent Files* and *Auto Save.*
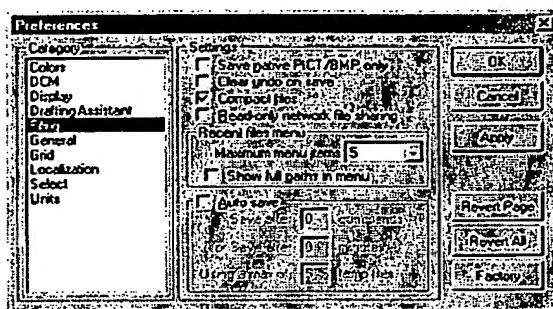
Save Native Picture Formats Only

Activating this option allows you to disable multiple platform picture support. Saving only the native format will reduce file size.

Clear Undo on Save

Activating this option allows you to flush the undo stack after a file has been saved. If the box is not checked, the undo stack is maintained after saving, increasing the file size.

Compact Files

If this option is checked, files compact when saved. Display facets are not written out when this option is selected. This file size reduction is especially noticeable on files containing solid models with many creation parts.

Read-only Network File Sharing

If this option is checked, the file can only be edited by the current user. No one else will be able to edit the file until the first person closes the file.

Recent Files

This option allows you to set the number of recent files that display in the File menu. Selecting a file from the menu immediately opens the file and bypasses the Open File dialog box.

Max Files in Menu	The drop down list allows you to specify 0 to 20 file names. The default number is five.
Show Paths in Menu	Checking this box displays the full path along with the recently used file name in the File menu.

Auto Save

Checking this box enables the automatic file saving options and directs your Designer Elements program to save a backup of your work periodically. If this box is not checked, automatic file saving does not occur.
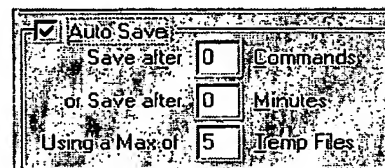
If auto save is triggered, a backup file is created in the Backup folder within the Designer Elements program folder. Backup files are numbered sequentially. If you have not yet saved your file, the backup will be named untitled.

If auto save is on but you have not modified any geometry in your drawing since the period that the last auto save operation occurred, auto save does not activate.

There are three auto save options:

Save after "N" Commands	Entering a value in this field specifies the number of drawing modifications (creations, edits or deletions) that must occur before an auto save triggers.
Save after "M" Minutes	Entering a value in this field specifies the number of minutes that must pass after the first drawing modification before an auto save triggers.
Using a Max of Temp Files	Entering a value in this field specifies the number of backup files to be created before reusing a backup file name. A large value will consume more disk space. The default value is five.

General

This category controls the general user interface behavior, view definitions and
arrow nudge distance.
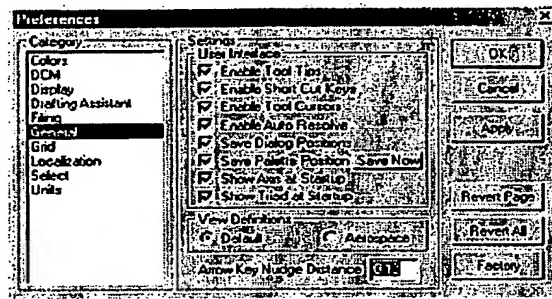
User Interface

This section provides the following check boxes for choosing interface options:

Enable Tool Tips   Enables the floating tool tip help windows.

Enable Short Cut Keys   Enables setting the keyboard short cut keys
through *File>Short Cuts.*

Enable Tool Cursors   Enables the display of tool specific icons when
using the tool. Without this enabled, the cursor
appears as crosshairs when moved into the draw-
ing area.

Enable Auto Regen   Enables the automatic regeneration of child objects
when parent objects are modified (Cobalt™ and
Xenon™ only).

Save Dialog Positions   Saves the location of dialog boxes. The next time
the dialog box displays, it is positioned at its most
recent location.

Save Palette Positions   Saves the tool palette positions and displays its sta-
tus when exiting. The next time your Designer Ele-
ments program launches, the palettes display in
their previous positions. Click the Save Now but-
ton to immediately save tool palette positions, pen

color, fill color, dialog box locations and display status.

Show Axis at Startup   Shows the coordinate axis when your Designer Elements program launches.

Show Triad at Startup   Shows the coordinate triad when your Designer Elements program launches.

View Definitions

Your Designer Elements program supports two different common view definitions, *Default* and *Aerospace.* Select the *Default* option to use view definitions commonly used for mechanical drafting. Select the *Aerospace* option to use view definitions commonly used for aerospace lofting.

Arrow Key Nudge Distance

The *Arrow Key Nudge* distance specifies how far the drawing will scroll when a keyboard arrow key is pressed in the **Selection** tool. The units for this option are based on the units chosen on the *Units* page of this dialog box.

Grid

This category controls the grid display and snapping behavior. The options include grid spacing, appearance, start up preference and color.
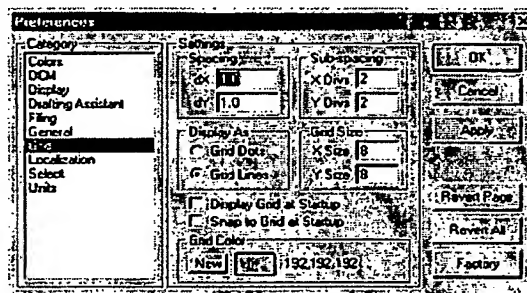
Spacing

The *DX* and *DY* values set the grid spacing. Units are based on those set on the *Units* page of the dialog box.

Sub-spacing

X Divs and *Y Divs* specify the number divisions for the grid to which geometry snaps in your drawing when the Snap to Grid command is activated.

Display As

The grid can be displayed as either dots or lines. Check either the *Grid Dots* or *Grid Lines* option.

Grid Size

Enter a value in these fields to set the grid size. The values represent the number of grid sections that appear in the positive and negative X and Y directions. A value of three entered into each field results in six grid sections in the X direction and six grid sections in the Y direction. The graphic here is an example of this.
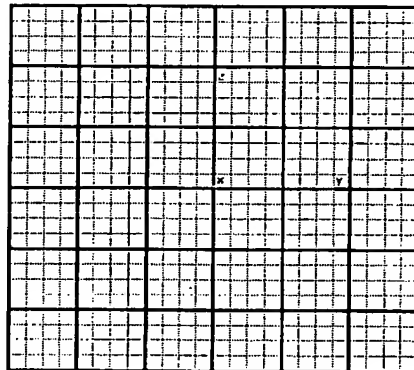
The grid also follows the current work plane allowing you to use it when creating objects in any plane. For example, if you change the plane from the Top plane to a user-defined plane, the grid displays as it did in the Top plane.

Display Grid at Startup

Check this box to display the grid when you first launch your Designer Elements program.

Snap to Grid at Startup

Check this box to activate the snapping function when you first launch your Designer Elements program.

Grid Color

You can select any color for the grid. The current color displays in the window.

1. Click New to display the color palette.

2. Select a color from the palette.

3. Click OK to accept the color and return to the *Grid* page. The new color now displays in the grid view window with the color name. For colors other than the standard colors, the color values display to the right of the view window.

Localization

This category controls the usage of decimals versus commas in your Designer Elements program.
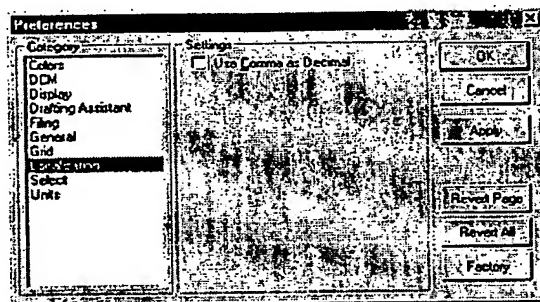
Use Commas as Decimal

Checking the *Use Comma as Decimal* option allows international users to display numbers according to their numerical standards.

Select

This category controls object selection behavior, including *Pick Box Size, Ambiguity Popup, Selection Color* and the *Selection Fence* mode.
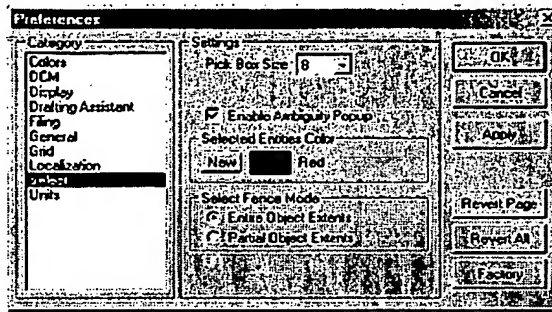
Pick Box Size

When you select an object, you place the cursor on the object and click the mouse. The *Pick Box* is the area around the cursor in which an object must be located to be selected. You can specify the area using the pull-down menu (ranges from 2 through 16, even numbers only). The *Pick Box* does not display.

Ambiguity Popup

The Ambiguity Popup displays when there are multiple objects near the vicinity of your selection and offers choices of which object to choose.

A check mark in the box enables the popup. This is the default setting.

Selected Entities Color

This option allows you to set the selection color. The current color displays in the window. To change the color:

1. Click New to display the color palette.

2. Select a color from the palette.

3. Click OK to accept the color and be returned to the *Select* page. The new color now displays in the view window with the color name. For colors other than the standard colors, the color values display to the right of the view window.

Select Fence Mode

Your Designer Elements program supports two mode when dragging to select one or more objects, *Entire Object Extents* or *Partial Object Extents.* Selecting the *Entire Object Extents* option allows only the selection of objects that fall completely within the selection fence. Selecting the *Partial Object Extents* option allows the selection of any object that has a portion within the selection fence.

Note: Be aware that control points will affect what is selected when using the *Partial Objects Extents* option. For example: With this option selected, if your selection fence covers a control point for a circle, only the center point is selected rather than the entire circle.

Units

This category controls the units and the number of decimal points displayed for your geometry.

Units can be set to inches, feet, feet/inches, millimeters, centimeters and meters.

In the *Display Decimal Digits* data field, enter the number of decimal places (between 1 and 8) you want to display. Three decimal places is the default.
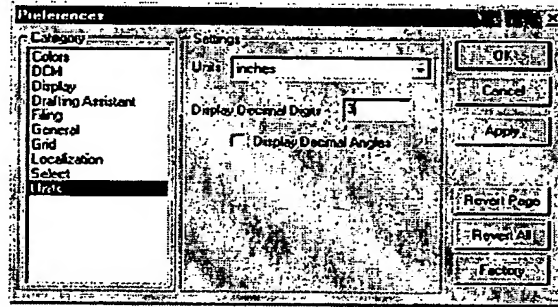
Tech Note:

If you choose feet/inches for units, you can enter the combination of feet and units in the Status Line and Edit Objects dialog box. However, these values will convert to decimals after they are applied to your geometry. For example: A value of 1"3" converts to 1.25 feet.

Changing the Preference Settings with the Preferences Command

1. Choose *File>Preferences*.
2. Select the category you want to set.
3. Make your desired changes.
4. Select another category or click OK to close the dialog box.

Changing the Preference Settings Manually

1. Quit your Designer Elements program.
2. Open the Preferences file, *prefs.ini*, in a text editor. The file is located in the Environ folder - the same folder as the executable file for your Designer Elements program.

3. Change the characteristics you want.

4. Save and close the file.

   The file must be stored in the original folder.

5. Relaunch your Designer Elements program.

The preferences are set.

Preferences and Object Creation

When you change any of the preference settings, the changes are only reflected for new objects.

Pen and Dimension Preferences

When you launch your Designer Elements program, you can set the default pen, text and dimension characteristics. Without anything selected, specify the settings. You do not have to save any file to save these preferences. Simply, exit the program and the pen, text and dimension settings are saved to the preferences *.ini* file.

Short Cuts

The *Short Cuts* command in your Designer Elements program allows you to create keyboard combinations, providing alternative ways to invoke commands. You can create short cuts for activating tools and commands, setting the work plane, changing layers, switching between wireframe and render modes and more. If you assign a short cut to a tool, the short cut displays with the tool tip when you move the pointer over the tool.

Short Cuts are organized by the *Short Cut Manager.*
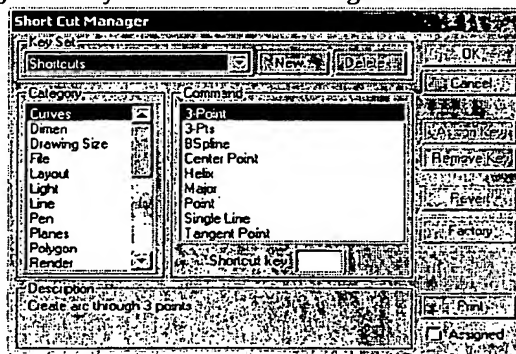
The Short Cut Manager dialog box includes the following elements:

Category Contains all available operations in your Designer Elements program.

Command Displays the commands assigned to the selected operation in the category list.

Shortcut key Displays the key combination for the selected operation. If you want to use the function keys, type **F** and the number (F3 for example) rather than pressing the function key itself.

Description Describes the action that results from the selected command.

The buttons in the Short Cut Manager include:

OK Saves the new Short Cuts and closes the Short Cut Manager.

Cancel Closes the Short Cut Manager without saving any changes.

Print Prints a hard copy of the current short cut key assignments. The factory default Short Cuts are included in Appendix E.

Assigned If this box is checked, when you print the Short Cut list, only assigned keys are included.

Assign Key Assigns the Short Cut key combination for future use.

If the short cut key is already assigned, a warning box displays asking if you want to remove the command assignment already using that key combination.
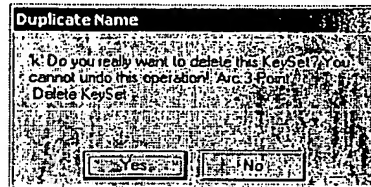
.Click Yes to accept the reassignment or No to be returned to the Short Cut Manager to enter another key combination.

Remove Key — Removes the key combination from the selected command.

Revert — Undoes any changes made to any groups.

Factory — Resets all groups to the factory settings.

Creating a New Short Cut

1. Choose *File>Short Cuts*.

2. Select the desired category and command in the appropriate sections.

3. Enter the key combination into the *Shortcut key* data field.

4. Click Assign Key. The key combination displays next to the selected command.

5. Continue entering all key combinations as desired.

6. Click OK to save the new short cut keys and close the dialog box.
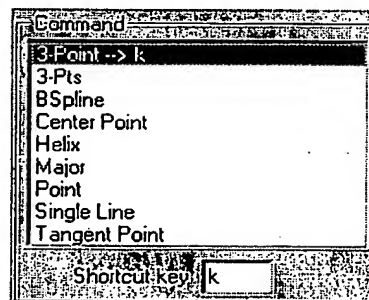
Preference Settings

Drawing Techniques

This chapter provides techniques for creating geometry and setting up your drawing area. The following topics are covered:

- Object Creation Methods
- Status Line
- Message Line
- Coordinate System
- Trackball
- Drawing Display Commands
- Drawing at Full Scale
- Default versus Selected Object Settings
- Escape Key
- Progress Bar
- Right Mouse Button

Object Creation Methods

In Vellum 3D and Vellum Draft, you had two methods for creating objects, clicking and dragging. In your Desiger Elements program, objects are created by clicking only.

As you create geometry, a rubberband image of the geometry appears showing you how the object will look when you click the last point.

To make object creation easier, your Desiger Elements program's wireframe tools contain a feature we call Smart Pointers. As you work with a tool, the cursor icon shows you the points you must indicate to create an object with the tool.

Each dot on the icon represents a point you must place by clicking. The smart pointer indicates the order for designating points.

Creating a Line by Clicking

1.Click the **Single Line** tool in the main tool palette. The Message Line reads: *Single Line: Pick beginning point [Ctrl = Copy Previous* (Windows) or *Option = Copy Previous* (Macintosh)].

2.Move the pointer to the drawing area and click to set the starting point of the line.

3. Move the mouse to the desired location for the endpoint of the line. As you do so, a rubberband image of the line appears.

Click to place the starting point of the line.

Click to place the ending point of the line.

4. Click to set the endpoint.

Immediately after construction, you can make changes in the Status Line at the bottom of the drawing area to alter the length or position of the line. If the geometry is not satisfactory, just press the BACKSPACE (Windows) or the DELETE (Macintosh) key

Status Line

Whenever you select a tool from a tool palette, the Status Line appears along the bottom of the drawing area. It contains data fields that provide information about the current construction. For example, when the **Single Line** or **Connected Lines**

tool is active, the Status Line contains data fields for the X, Y and Z coordinates of the beginning point and the change of X, Y and Z values. It also contains the value of the length and angle of the line.

| | X -2.702 | Y 2.083 | Z 0.0 | dX 2.702 | dY 0.0 | dZ 0.0 | L 2.702 | A 0° |
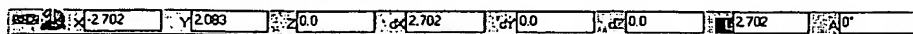
You can use the Status Line in three ways:

- To create an object with keyboard entries only.
- To edit an object that was just created and is still selected.
- To create additional wireframe objects using the current tool.

Whenever you construct an object, the status data field containing the specification that you are most likely to change is active (the data field is highlighted). For example, when you draw a line with the **Single Line** tool, the Length data field is highlighted so you can enter a value for the length. Just type a value. When you press ENTER (Windows) or RETURN (Macintosh), the line is redrawn at the new length.

You can set the number of decimal places for Status data field entries to display by going to *File>Preferences>Units*.

Using the Status Line

If you want to make an entry in a different status data field. you can use one of four selection methods:

- Press the TAB key to cycle the selection highlight through the status data fields from left to right.
- Click inside the status data field and the pointer becomes an *I-beam* text cursor.
- Double-click inside the status data field to select the entire contents of the data field.
- Click the data field label to select the entire contents of the data field.

Units and the Status Line

Values can be entered in inches, feet, feet and inches, millimeters, centimeters, meters and mathematical expressions (ex. 10"+2.54 cm).

When the units in Preferences are set to feet and inches. it's important to be aware of the following rules:

- All numbers are assumed to be feet unless accompanied by the unit symbol, like " for inches. Entering a 1.5 in the field is read as 1.5 feet. If you want 1.5 inches, enter 1.5", 1.5i, 1.5in, 1.5 inch, etc.

- If you want to enter fractions of inches, each entry must include the unit symbol. For example, 5 feet 6 5/8 inches must be entered 5' 6 5/8". Internally this is converted as 5' + 6" + 5/8". If the inch symbol is not included with the fraction, 5/8 will be interpreted as a fraction of a foot.

Copying and Pasting Status Line Entries

You can copy and paste Status Line text for use in another data field.

For Windows, select the Status Line text, hold down the right mouse button and use the *Copy* and *Paste* commands available in the menu that appears. You cannot use the *Copy* and *Paste* commands in the Edit menu.

For Macintosh, use z +C to copy and z +V to paste text. You cannot use the *Copy* and *Paste* commands in the Edit menu. These function only for your Desiger Elements program data.

Status Line Entries and Tool Operations

Information entered in the Status Line is registered in two different ways in your Desiger Elements program depending on what step you are on in creating your geometry.

- After you select a tool, you can immediately enter values in the Status Line data fields. When you perform the tool operation, those values will be used to create your object.

- After you create your object with a tool and the object is still selected, you can enter new values in the Status Line data fields. To move from field to field you use the TAB key. When you press ENTER (Windows) or RETURN (Macintosh), you object changes to reflect those values. Once you hit ENTER (Windows) or RETURN (Macintosh), future changes can only be made to the object through the Edit Objects dialog box.

- When entering values in the Status Line, the accuracy of your geometry depends on the number of decimal places you enter.

- The Status Line references the current coordinate system current work plane. All values in the Status Line are based on the current coordinate/work plane system.

Tech Note:

There are two methods for making Status Line entries in Your Desiger Elements program. The first is Select a tool, create the object, type the new values and press ENTER (Windows) or RETURN (Macintosh). The selected geometry changes. In the second method, you select the tool, type the desired values in the Status Line and press ENTER (Windows) or RETURN (Macintosh). The values are now registered. Then you create the geometry with the tool.

Using the Status Line with Drawing Tools

Once you have drawn an object, you can adjust the specifications —the length, angle and location—in the Status Line. You can make these changes immediately before you construct another object, select a different tool or choose a command however it is not necessary.

You can make only one series of changes in the Status Line (in as many fields as necessary); after you press ENTER (Windows) or RETURN (Macintosh) your Desiger Elements program redraws the object to your specifications. After this, you must make subsequent changes using the *Edit Objects* command in the Edit menu.

Try the following exercises to create and change a single line with the Status Line.

Altering Geometry in Progress with Status Line

1. Select the **Single Line** tool. The Message Line reads: *Single Line: Pick beginning point [Ctrl = Copy Previous* (Windows) or *Option = Copy Previous* (Macintosh)*]*.

2. Click two locations in the drawing area. The length (L) field automatically highlights in the Status Line.

3. Type **3**. The 3 is entered directly in the L field.

4. Press the TAB key to select the next status field. The angle (A) field now highlights. (If your monitor does not display the Angle field, click on the scroll arrow at the right to display it and then press the Tab key to highlight the data field.)

5. Enter **15**.

6. Press ENTER (Windows) or RETURN (Macintosh).

   Pressing ENTER (Windows) or RETURN (Macintosh) completes the data entry for this object. The line is redrawn 3 units long and at a 15° angle.

Remember that when you press ENTER (Windows) or RETURN (Macintosh), your Desiger Elements program constructs the object based on the specifications in the Status Line.

Creating Additional Geometry with the Status Line

1. With the **Single Line** tool still selected from the previous example, click 2 more points.

2. Type **4**.

3. Press the TAB key and type **25** in the Angle field.

Tip:

Vellum 3D Users: If you pressed ENTER (Windows) or RETURN (Macintosh) a second time after creating a line in Vellum 3D, you would create an identical object in the same location. This is not the case with your Desiger Elements program.

4. Press ENTER (Windows) or RETURN (Macintosh). Another line is drawn.

Creating New Geometry with the Status Line

1. Choose the **Selection** tool so the Status Line clears.

2. Click the **Single Line** tool again.

   The X status field is active, showing that you can enter a value for the X coordinate of the line's beginning point.

   Do not press ENTER (Windows) or RETURN (Macintosh) until you reach step #14.

3. Type **0**.
4. Press the TAB key. The Y data field highlights.
5. Type **0**.
6. Press the TAB key. The Z data field highlights.
7. Type **0**.
8. Press the TAB key.

   The dX data field highlights. The dX value is the delta X, the numeric difference between the beginning and ending X coordinate.

9. Type **2**.
10. Press the TAB key. The dY data field highlights.
11. Type **2**.
12. Press the TAB key. The dZ data field highlights.
13. Type **0**.
14. Press ENTER (Windows) or RETURN (Macintosh). The line is drawn.
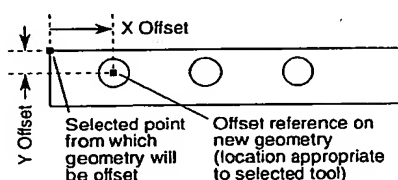
Creating Geometry Offset from a Point

If you want to create geometry offset from an existing point, you can use the Status Line to specify the offset.

Creating Geometry Offset from a Point

1. Select the tool you want to use.
2. Move the pointer over the control point from which you want the offset.
3. Click once to lock onto that point.
4. Finish creating the geometry.

5. With the geometry still selected, click in the appropriate X, Y, or Z data field in the Status Line, placing the text cursor at the end of the entry.

6. Type the offset (such as + **3**) and press ENTER (Windows) or RETURN (Macintosh).

7. Continue with your construction.

Selected point from which geometry will be offset — Offset reference on new geometry (location appropriate to selected tool)

Coordinate System Axis

The coordinate system axis, at the left of the Status Line, displays the coordinate system currently set for the file. You can choose either the Global (world coordinate system) or a user-defined coordinate system. The graphic below represents the global coordinate system. The default system is the Global coordinate system.

The Global System aligns with the X, Y and Z axes (X = 1, 0, 0; Y = 0, 1, 0; Z = 0, 0, 1). The user-defined coordinate system is set by you. Planes labeled as *DynWorkPlane* or *UserWorkPlane#* are part of the user-defined coordinate system. See Chapter 32 for information on the Work Plane Manager and defining your own work planes.
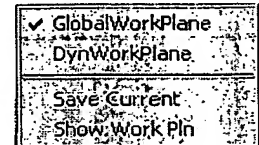
Choosing a Coordinate System

1. Choose the coordinate system by clicking on the coordinate system axis icon at the far left of the Status Line.
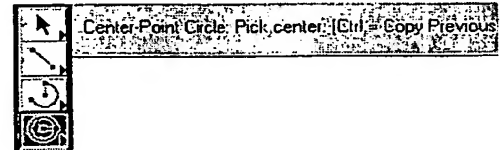
A menu displays.

2. Choose the GlobalWorkPlane, DynWorkPlane or any user-defined work plane.

   The work plane and coordinate system are now set.

3. Continue designing.

Message Line

The *Message Line* is an important feature when drawing. After selecting a tool, the line displays the tool name and the first step in its use.

Some tools display a subpalette and a pull-down option list. As you finish each step, the next step displays until all steps are completed. The Message Line may also display additional commands that can be used with the tool.

Trackball

The *Trackball* gives you the ability to rotate the view orientation of your geometry in the drawing area. You can also rotate the view around an object by selecting it before using the Trackball. The objects include features such as holes. You have to select the hole through the Design Explorer to do the rotation. (Selecting a hole results in a view rotation around the hole center by referencing the faces and edges introduced by the hole.)

To display the Trackball, choose **Window>Trackball**. When the Trackball displays a check mark appears in front of the command in the Windows menu. You can drag the Trackball to any location in your drawing area.
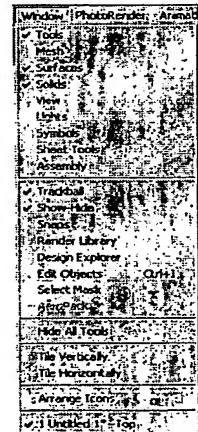
You can toggle the Trackball between two display types, the sphere display and the step display. Both displays include a views pull-down menu.

Axis Locking

The **Trackball** will lock rotations to an X, Y or Z axis. Hold down the X, Y or Z key on your keyboard while using the mouse in the Trackball window and the Trackball will rotate only in the direction of the key being pressed.

Sphere Trackball

The *Sphere Trackball* gives the ability to drag your view to the desired rotation. You can drag beyond the boundary of the trackball and continue the rotation. The sphere trackball is the default display.
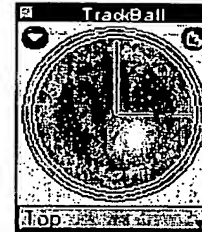
Using the Sphere Trackball

1. Choose *Window>Trackball.*

2. Drag the pointer on the Trackball to rotate the view.

    The model rotates as you drag. See a later section for setting view rotation options. The model continues rotating if you drag the pointer past the edge of the trackball display and until you release the mouse button.

Setting View Rotation Options

You can to set view rotation options for the Sphere Trackball in the View Rotation Options dialog box.

↦ To display the dialog box, double-click on the gray area of the Sphere Trackball.

The View Rotation Options dialog box appears containing the following:
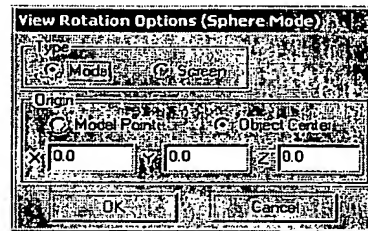
Type	Allows you to set the rotation type, *Model* or *Screen*.
	The *Model* option rotates the view around the x, y and z axis as displayed by the Axis icon.
	The *Screen* option rotates the view around the screen axis with the x axis oriented horizontally, the y axis oriented vertically and the z axis oriented normal to the screen.
Origin	Allows you to set the origin at either the *Model Point* or the *Object Center.*
	The *Model Point* option gives you the ability to determine the rotational point yourself. You can either enter the values in the x, y and z data fields

or click on your geometry to set the location (values are entered automatically).

The *Object Center* option gives you the ability to rotate your geometry around the center of the objects in your drawing. This center is calculated by your Desiger Elements program. When you select this option, the x, y, and z data fields are unavailable.

You can choose only one of the four rotational options, *Model Type, Screen Type, Model Point Origin* or *Object Center Origin.*

Click OK to accept your settings and close the dialog box or Cancel to close the dialog box without accepting the changes.

Step Trackball

The *Step Trackball* gives you have ability to rotate your view in regular angle increments or in a continuous movement and provides you with addition options in the View Rotation Options dialog box.

Change the Sphere Trackball to the Step Trackball by clicking the arrow button on the right side of the Trackball title bar.

The Step Trackball includes the following icons:

Directional Arrows

These arrows allow you to rotate your view in a specific direction. Clicking the vertical arrows rotates your geometry about the x axis. Clicking the horizontal arrows rotates your geometry about the y axis. Clicking the angled arrows rotates your geometry about the z axis. (In the View Rotation Options dialog box, you can choose either the model or screen axis to reference the rotation when using these arrows. See a later section, "Setting View Options," for more information.)

Step Rotation

This display, represented by the stair icon, toggles with Continuous Rotation. With the step icon displayed, rotation moves
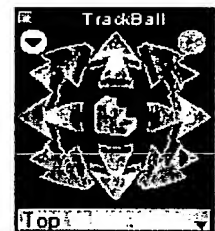
through stepped increments in the direction you select.

You can set the degree increment for the steps in the View Rotation Options dialog box. See a later section, "Setting View Options," for more information.

Continuous Rotation

This display, represented by the circular arrow, toggles with Step Rotation. With this icon displayed, rotation is a continuous motion in the direction you select.

You can temporarily halt the rotation by placing the cursor over the arrow and pressing. When you release the mouse, the rotation continues. To stop the continuous rotation, click the circular arrow icon.

Using the Step Trackball

1. Choose *Window>Trackball*.

2. Click on the arrow button on the right side of the Trackball title bar to change the display to the Step Trackball.

3. Click one of the directional arrows. The model rotates a specified number of degrees. Or...

   Click on the *Step Rotation* icon to toggle the display to the *Continuous Rotation* icon and click one of the directional arrows. Click on the circular arrow icon to stop the rotation.

Setting View Rotation Options

Your Desiger Elements program allows you to set view rotation options for the Step Trackball in the View Rotation Options dialog box.

To display the dialog box, double-click on the black area of the Step Trackball. View Rotation Options containing these options:
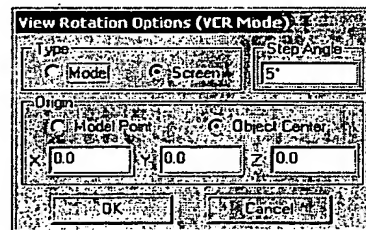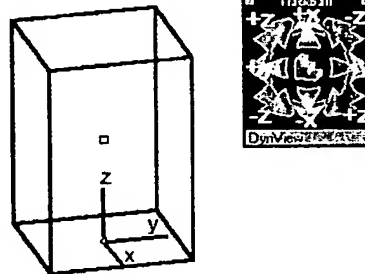
Type

This option sets the rotation type, *Model* or *Screen*.

The *Model* option rotates the view around the x, y and z axis as displayed by the Axis icon. The option allows you to rotate the model around one stationary axis. See the graphic here.

The *Screen* option rotates the view around the screen axis with the x axis oriented horizontally, the y axis oriented vertically and the z axis oriented normal to the screen.

Step Angle   Allows you to set the rotation angle for the Step Trackball.

Origin   Allows you to set the origin at either the *Model Point* or the *Object Center.*

The *Model Point* option gives you the ability to determine the rotational point yourself. You can either enter the values in the x, y and z data fields or click on your geometry to set the location (values are entered automatically.

The *Object Center* option gives you the ability to rotate your geometry around the center of the objects in your drawing. This center is calculated by your Desiger Elements program. When you select this option, the x, y, and z data fields are grayed out.

You can choose only one of the four rotational options, *Model Type, Screen Type, Model Point Origin* or *Object Center Origin.*

Click OK to accept your settings and close the dialog box or Cancel to close the dialog box without accepting the changes.

Trackball View Menu

The Trackball has a pull-down menu for specifying the view or saving the current view. The views available in this menu include the default views and any user-defined views.

Using the Trackball View Menu

1. Move the pointer to the current view name displayed at the bottom of the Trackball window.

2. Press the mouse button.

   The Trackball views menu displays.

3. Choose the view orientation you want to display in the current window.

   The view orientation changes to your specification in the view window. A check mark appears next to the selected view, as shown here.
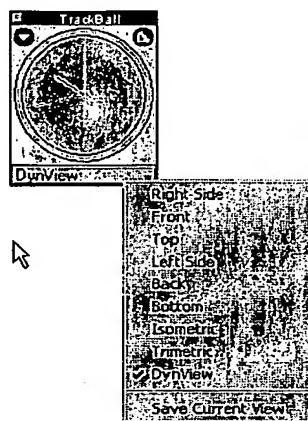
View Rotation Short Cut

You can rotate your view by holding down the SHIFT key and pressing one of the keyboard arrows. This rotates the view a specified number of degrees.

You can also change your view with the following keyboard short cuts: a - Side View, s - Front View, d - Top View, f- Isometric View and g - Trimetric View.

Drawing Display Commands

There are a number of commands that display features that may assist you in creating geometry. These include: *Show/Hide Triad, Show/Hide Axis, Show/Hide Work Plane, Show/Hide Points* and the Grid commands.

Show/Hide Triad

Top

This command in the Planes menu toggles the display of the *Triad* symbol in the upper-left corner of the view windows. The Triad illustrates the orientation of the x, y, z axes and the work plane. See Chapter 3 for more information on the Triad.
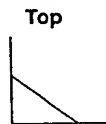
Show/Hide Axis

This command in the View menu toggles the display of the Axis symbol at the drawing origin. The Axis establishes the direction of the x, y and z axes. The Axis can clarify the geometry location when rotating the view.
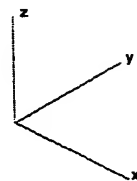
Show/Hide Work Plane

This command in the Planes menu toggles the display of the Work Plane icon on your geometry. The graphic below shows the work plane set to the Top plane.
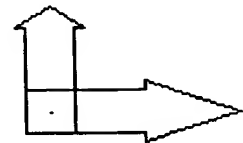
Show/Hide Points

This command in the Edit menu toggles the display of the control points for selected objects. See Chapter 4, "Selecting Objects," for more information.

Grid

The grid overlays your drawing and can help you create and align geometry. The grid is made up of horizontal and vertical lines of dots. The grid commands, *Show/ Hide Grid* and *Snap to Grid* are found in the Planes menu. Set your Grid preferences (spacing, the number of divisions, display appearance and startup options by choosing *File>Preferences>Grid*.

Show/Hide Grid Command

This command in the Planes menu toggles the display of the grid. The grid is always aligned with the work plane's x and y axis. You can display the grid when viewing any plane.

Snap to Grid Command

This command in the *Window>Snaps* menu toggles on and off and is normally used with the grid. However, this command does not require that the grid is displayed.

When *Snap to Grid* is on (a check mark appears next to the name), the Drafting Assistant snaps all geometry to the grid. In other words, if the grid is set to .25 inch spacing, you can't construct an object closer than .25 inch to another object.

Drawing at Full Scale

Whether you are designing or drafting a highly detailed blueprint, you should create the geometry at its actual size. Your Desiger Elements program allows you to construct the part using full-scale specifications and then set the visual scale of the drawing. In this way, the part dimensions to its true-to-life measurements. Drawing at full scale has the following advantages:

- Scaling mistakes are eliminated

- Dimensions are automatic (you must dimension manually if you do not draw at full scale)

- Associative dimensions update when the object is edited (manual dimensions do not)

- The size relationship of imported parts is compatible.

Once your project is drawn, you can dimension it and scale it visually to fit into a standard drawing size, if you wish with the Print Setup command (Windows) or Page Setup command (Macintosh) in the File menu. Regardless of how you set up your drawing, the actual size of the geometry remains constant unless you edit it.

If you want to create ensure that your geometry is contained within a specified page bounds at a 1:1 scale, you can display the page bounds. See Chapter 37 for more information.

When you open a new Desiger Elements program document, the drawing area is an infinitely large sheet so that you can design anything at full size. For a simplistic example, here's how to draw and view a line 83 feet long:

1. Draw a line, specifying **83'** for the length.

   The line extends off the screen.

2. Choose *View>Zoom All.*

   The entire 83 foot line is visible on the screen.

Using the draw to scale/Zoom All method, you can create accurate full-scale drawings which are displayed at the magnification you choose. The actual size of an object is not affected by zoom magnification or reduction.

Tip:
If you notice a gray rectangle in your drawing area when you first start your Desiger Elements program, choose **File>Page Setup.** The option, *Show Page Breaks in Drawing Windows* may be selected. The gray rectangle is the page bounds.

Zoom All magnifies or reduces all objects on your drawing to fill the screen—regardless of the size of the objects.

Default versus Selected Object Settings

When no object is selected, any setting changes made with respect to *Selectable Points, Grid, Axis, Triad, Show Points, Construction Lines, User-defined plane, Pen, Text, Dimension*, tool palettes (choice, status and location) and *Render* become the default for all open files and the current Desiger Elements program session. When an object is selected, any change made will only affect the object.

Escape Key

When geometry becomes quite complex, the time required for operations to complete will inevitably lengthen. You can interrupt the command by pressing the ESC key.

Progress Bar

The progress bar provides you with feedback when opening files, importing or exporting files or performing complex operations. The bar provides you with feedback about the status of the operation.
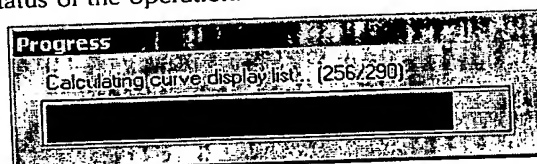
Right Mouse Button

Your Desiger Elements program gives you access to commands though the right mouse button. If you are a Macintosh user and do not have a right mouse button, these same commands are available by holding down the CONTROL key and pressing the mouse button.

Different sets of commands display depending on whether the button is pressed while on or off an object or when a drawing view is activated.

Over No Object

When you click the right mouse button (Windows) or Control + mouse button (Macintosh), the following popup menu appears:

The menu includes the following commands:

**Zoom All, Zoom Window, Zoom In, Zoom Out** — These commands are the same as those in the View menu.

Dynamic Pan, Dynamic Zoom, Dynamic Rotate — These commands perform the same function as the **Dynamic Pan, Dynamic Zoom** and **Dynamic Rotate** tools in the **View** tool palette. When you select one of these commands, the pointer icon becomes that of the tool. You can perform the operation once and then the icon reverts back to the selected tool.

If you want to perform multiple operations, hold down the Shift key before selecting the command. When you release the Shift key, the icon reverts back to the selected tool.
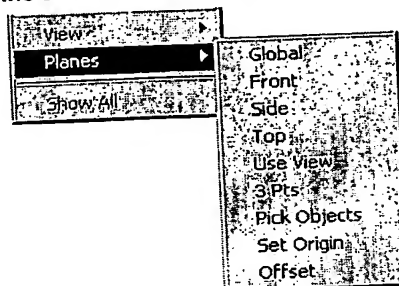
View — This command displays all default views and any user-defined views.
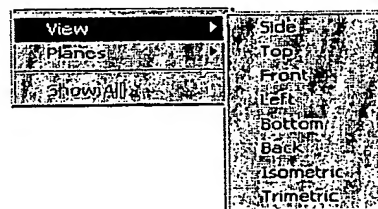
Planes	This command displays the same commands as those in the Planes menu, with the exception of the *Show Work Pin* command.

Show All	This command is enabled when objects are hidden in the drawing and is the same as the *Show ALL* command in the Show-Hide dialog box.

Over An Object

When you select an object. place the pointer over the selected object and click the right mouse button (Windows) or Control + mouse button (Macintosh), the following popup menu appears:
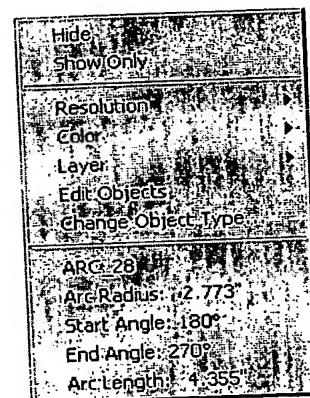
The menu includes the following:

Hide, Show Only	These commands are the same as those in the Show-Hide dialog box allowing you to hide or show the object.
Resolution	This command displays a menu allowing you to change the object's resolution to Super Fine, Very Fine, Fine Medium or Coarse.
Color	This command displays the color menu allowing you to change the color or the object. These are

the same color options available when choosing
Pen>Color.

Layer

This command allows you to change the object's
layer to any layers in the file, whether or not a
layer is hidden. It also includes The *More* com-
mand. Selecting More displays the following dialog
box:

Change Layer

Layer1

OK

Create New Layer

Cancel

Click on the Create New Layer button and then
click OK to move the object to the new layer. The
new layer is titled with a default name (for exam-
ple, Layer3). You can change the name through
the Layer Manager (*Layout>Layer Manager*).

Edit Objects

This command displays the Edit Objects dialog
box.

Object Name

The name of the object appears in the menu. You
can change the object's name by clicking on the
name. The following dialog box appears:

Enter new entity name

ARC 28

Cancel

OK
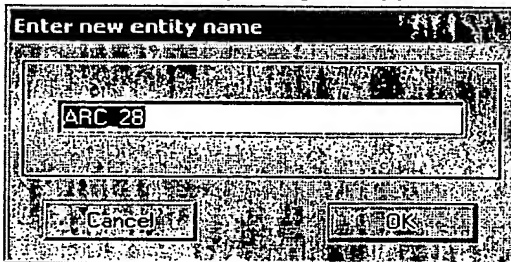
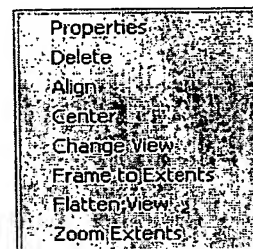Type a new name and click OK to make the
change.

Object Characteristics

For a wireframe object, the menu also provides its geometric characteristics. For example, an ellipse displays the major radius, the minor radius and circumference.

Selected Drawing View

When a drawing view is selected and you click the right mouse button (Windows) or Control + mouse button (Macintosh), the following popup menu appears:

These commands are identical to those in the Drawing View pull-down menu. See Chapter 36 for information on these commands.

| Properties |
| Delete |
| Align |
| Center |
| Change View |
| Frame to Extents |
| Flatten View |
| Zoom Extents |

Introduction to Wireframe Modeling

In your Desiger Elements program you have the ability to create wireframe, surface and solid models. The most basic model is the wireframe model. A wireframe consists of the geometry that makes up the edges of the object. The word "wireframe" relates to the idea of a wire that is bent to follow an object's edges. A wireframe model is the simplest mathematical representation of an object. '
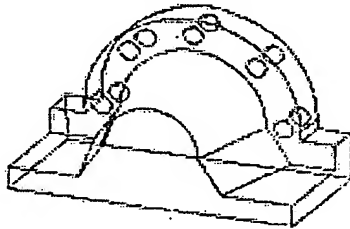
Wireframes in your Desiger Elements program consist of points, lines, arcs, circles, ellipses, conics, splines or a combination of any of these. These particular wireframes are also collectively referred to as curves. Although wireframes are limited in the amount of model content they represent, they are powerful building blocks for creating more complex models composed of surfaces and solids.

A wireframe model can often be used in place of a prototype (to run simulations and tests on the computer rather than in the laboratory). Models can be used for checking visual specification, measuring distances between points within the model and observing the visual and real intersections of lines.

The topics discussed in this chapter include:

- Wireframe tools
- Wireframes and the Drafting Assistant
- Wireframes, Selection and Display
- Object Types and Edit Objects

Wireframe Tools

These chapters in this section describe how to create wireframe geometry with your Desiger Elements program tools. They also provide information on how the Drafting Assistant helps you design faster and easier.
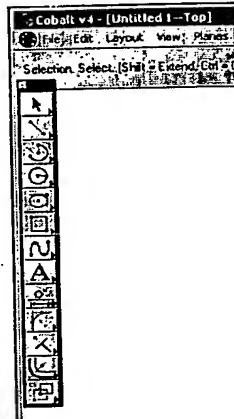
Wireframe tools are contained in the main tool palette, located at the left side of the Desiger Elements program drawing area.

You can change the default status (open or closed) and location of the main tool palette by choosing your status and location and quitting your Desiger Elements program. The next time you launch the program, the palette will retain the status and location you chose.

Each icon in the palette is the first in the subpalette of tools grouped together by purpose, as shown here.

Line tools	
Arc tools	
Circle tools	
Ellipse/Conic tools	
Polygon tools	
Spline/Helix tools	
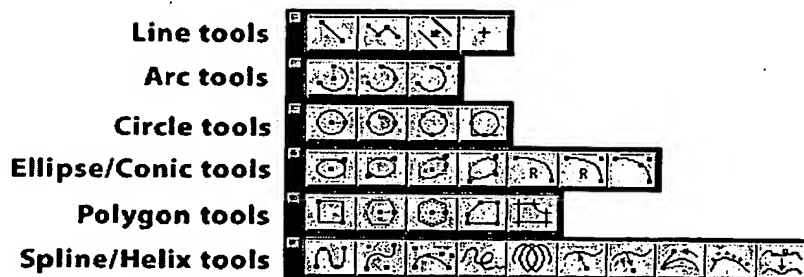
Information on using each tool is contained in the chapters that follow.

Wireframes and the Drafting Assistant

The Drafting Assistant recognizes several useful snap locations associated with wireframe objects. These dynamic snap locations include:

- Endpoints
- Midpoints
- Intersections
- Projections
- Centers
- Vertices
- Tangencies

The Drafting Assistant recognizes such points in all three dimensions, making 3D drafting much easier.

Wireframes, Selection and Display

Wireframes are selected when they are within the selection fence or the boundaries of a single pick box as defined in Preferences (see Chapter 6, "Preference Settings"). Conics, ellipses, splines and circles have resolution attributes that impact the screen display and printer output. You can change the resolution of the selected object by choosing *Edit>Change Resolution*.

Changing an Object's Resolution

1. Select the object.

2. Choose *Edit>Change Resolution*. The Object Resolution dialog box appears.

Object Resolution

Resolution
- Super Fine
- Very Fine
- Fine
- Medium
- Coarse

OK

Cancel

☐ Even Distribution (Slower)

You have five resolution options: *Super Fine, Very Fine, Fine, Medium* and *Coarse. Medium* is the default option.

Coarse   Medium   Fine   Very Fine   Super Fine
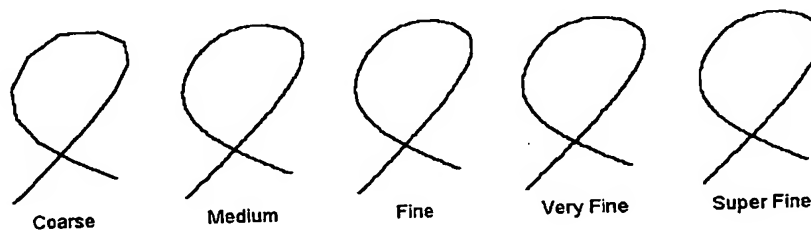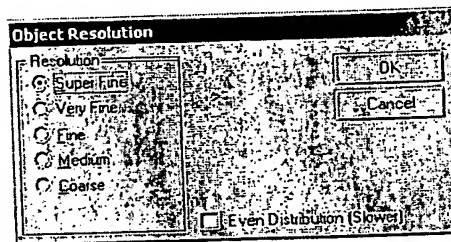
Objects Characteristics and Edit Objects

All wireframe objects you create with a Desiger Elements program tool are defined by their own geometric, display and attribute characteristics. The Edit Objects dialog box provides information for these three categories. Where the display and attribute characteristics are identical for wireframe objects, the geometric characteristics differ according to a particular object.

For example: A line created by the **Single Line** tool includes the following geometric categories: Length, Angle, End 1 (X, Y and Z values) and End 2 (X, Y and Z values).

Chapters 8 through 13 introduce you to the wireframe tools. With every tool description there is a list of the geometric characteristics displayed in the Edit Objects dialog box. For information on using the *Edit Objects* command and the dialog box, see Chapter 24.

Line Tools

The Line tools in the **Line** tool palette create line segments, connected lines, lines parallel to existing lines and points. As you create a line, the coordinate locations, line length and angle from horizontal appear in the Status Line. All geometry appears in the current pen specifications for color, weight and pattern.

For each tool you can enter values in the Status Line to define a line, either before or after you create it. If you enter the values after you select the tool but before you create the line, your first click in the drawing area automatically registers all Status Line values. If you enter values in the selected Status Line data field after creating the line and while the line is still selected, pressing ENTER (Windows) or RETURN (Macintosh) updates the line to reflect the new values.

The topics explained here include

- **Single Line** Tool

- **Connected Lines** Tool

- **Parallel Line** Tool

- **Point** Tool

- Modifying Lines

Your Designer Elements program does not support Smart Wall entities. All imported Smart Walls are converted into individual curves.

Tech Note:

Vellum 3D Users: your Designer Elements program, unlike Vellum 3D, will not create a second entity if you hit ENTER (Windows) or RETURN (Macintosh) while still in a tool.

9-1

Single Line Tool

This tool draws a line between two points. You can click points to draw a line.

Point 2

Point 1

Using the Single Line Tool

1. Select the tool. The Message Line reads: *Single Line: Pick the beginning point. [Ctrl = Copy Previous]* (Windows) or *[Option = Copy Previous* (Macintosh)]*.

2. Click to place the first endpoint of the line.

3. Move the cursor to a new location. As you do, a rubberband image appears that previews your construction.

4. Click to place the last point of the line.

To copy the line just created, as the Message Line indicates, hold down the CTRL (Windows) or the OPTION (Macintosh) key and click once in the drawing area to set the beginning point. An identical line appears beginning where you clicked and on the current work plane.

The Status Line contains the X, Y, and Z coordinates of the beginning, the relative location of the end (delta X, delta Y and delta Z), the line length, and the angle from horizontal. (If any of the fields do not display, click the arrow at the right end of the Status Line). Once a line is drawn, the Length field is active in the Status Line.

X -1.863	Y 2.396	Z 0.0	dX 2.559	dY 0.0	dZ 0.0	2.559	A 0°

Drawing a Line Perpendicular to Another Object

1. Construct the object.

2. Move the pointer to the object until a Drafting Assistant *on* notation appears (*endpoint, midpoint, quadrant* etc., will not work, only "*on*").

3. Drag straight away from the object in a perpendicular direction. A *perpendicular* line will appear attached to the object. Notice that the line stays perpendicular but slides along the object.

4. Drag to the desired length.

Drawing a Line Tangent or Perpendicular to an Arc, Circle or Ellipse

1. Construct an arc, circle, or ellipse.

2. Choose the **Single Line** tool.

3. Move the pointer to the arc until a Drafting Assistant *on* notation appears (*endpoint, midpoint, quadrant* etc., will not work, only "*on*").

4. Drag in the appropriate direction (straight out for perpendicular or at an angle for tangent) until the Drafting Assistant perpendicular or *tangent* notation appears.

5. When the Drafting Assistant locks on to *perpendicular* or *tangent*, drag the line around the arc to the desired location and extend the line to the desired length.

Geometric Characteristics

A single line is created by clicking two points and is made up of the following characteristics: Length, Angle, End 1 (X, Y and Z values) and End 2 for X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the line and choose **Window>Edit Objects** or double-click on the line.
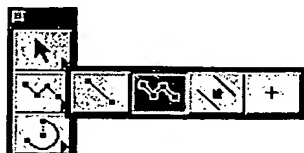
Connected Lines Tool

This tool draws lines in which the endpoint of one line segment is the beginning point of the next.

Using the Connected Lines Tool

1. Select the tool. The Message Line reads: *Connected Lines: Pick the beginning point.*

2. Click to indicate the endpoints of the line segments.

    If you click a point and then change your mind, press the ESC key, or choose *Undo* to remove the last segment.

    After the beginning point is set, the Message Line changes to reflect the next step.

3. Indicate the last point by double-clicking, hitting the ESC key or by choosing another tool.

After completing at least one segment with the **Connected Lines** tool, you can create a tangent arc off of the last line by holding down the CTRL (Windows) or the OPTION (Macintosh) key (the pointer temporarily changes to an "arc" icon) and clicking or dragging to the next point. The Message Line notes this added feature. Several tangent arcs can be strung together by continuing to hold down the CTRL (Windows) or OPTION (Macintosh) key.
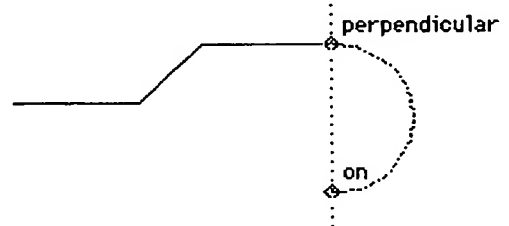
The radius of arcs created with this method cannot be edited in the Status Line.)

The Status Line contains the X, Y and Z coordinates of the beginning, the relative location of the end (delta X, delta Y and delta Z), the line length and the angle from horizontal. Once a line segment is drawn, the Length field is active in the Status Line.

X -1.863	Y 2.396	Z 0.0	dX 2.559	dY 0.0	dZ 0.0	■ 2.559	A 0°
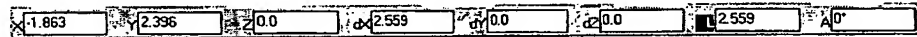
Geometric Characteristics

A connected line is multiple single lines connected at their endpoints. Lines are made up of the following characteristics: Length, Angle, End 1 (X, Y and Z values) and End 2 (X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the line and choose *Window>Edit Objects* or double-click on the line.

9-4

Parallel Line Tool

This tool constructs a line parallel to an existing line in the current work plane.
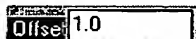
Using the Parallel Line Tool

1. Select the tool. The Message Line reads: *Parallel Line: Drag new line off existing line.*

2. Drag off the desired line and release to indicate the position for the new parallel line. A rubber-band line moves with the pointer. The distance field is active in the Status Line and displays distance from the original line that you dragged.
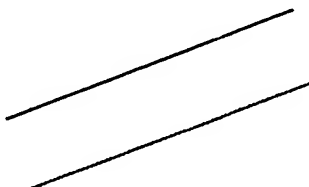
   If you type in your own value and hit ENTER (Windows) or RETURN (Macintosh), the parallel line will move the offset distance specified.

The Status Line contains the Offset data field.

Offset 1.0

Geometric Characteristics

A parallel line is a duplicate of a line created by the **Single Line** tool or the **Connected Lines** tool. The line is made up of the following characteristics: Length, Angle, End 1 (X, Y and Z values) and End 2 (X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the line and choose *Window>Edit Objects* or double-click on the line.
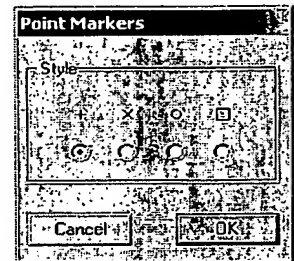
Point Tool

When you select the **Point** tool, a subpalette appears in the Message Line, with three **Point** tools, **Point at an XYZ Location, Points on a Curve** and **Points on Surface.**

You can choose the appearance of the points using any of these tools. Press the CTRL (Windows) or the OPTION (Macintosh) key to display the Point Markers dialog box.

Click the radio button for the desired marker (crosshairs plus, crosshairs x, empty diamond or empty square) and click OK to close the dialog box. When you click to place the point in the drawing area, the point is represented by the new marker. The Point Marker style cannot be saved as a preference.
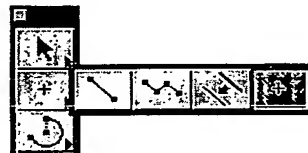
## Using the Point at an XYZ Location Tool
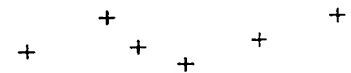
You create individual points in your drawing area with this tool.

1. Select the **Point** tool from the palette.

2. Select the **Point at an XYZ Location** tool in the Message Line. The Message Line reads: *Point: Enter point. [Ctrl = Marker* (Windows) or *Option = Marker* (Macintosh)].

3. Click a point in the drawing area.

The Status Line contains the X, Y and Z location of the point.

X 0.0   Y 0.0   Z 0.0
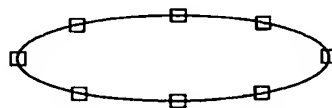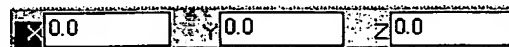
Using the Points on a Curve Tool

This tool places a series of points distributed equally along a curve (remember that curves include lines, circles, ellipses, arcs and

splines). You cannot use this tool on polygons created using one of the **Polygon** tools.

1. Select the **Point** tool from the palette.

2. Select the **Point on a Curve** tool in the Message Line. The Message Line reads: *Point on Curve: Select curves to distribute points on. [Ctrl = Marker* (Windows) or *Option = Marker* (Macintosh), *Shift = Extend]*.

3. Enter the number of points you want distributed along the curve in the #Pts data field of the Status Line.

4. Select the curve. If you want to select more than one curve, hold down the SHIFT key before selecting the first curve and while selecting succeeding curves.

   Points are equally distributed along the curve. For closed curves, the start and endpoint are the same.

The Status Line contains the number of points to distribute along a selected curve.
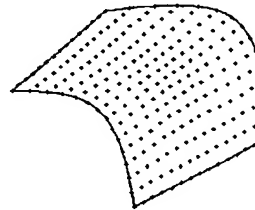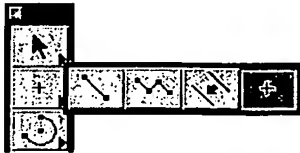
Using the Points on a Surface Tool

This tool places a series of points distributed equally along a surface.

1. Select the **Point** tool from the palette.

2. Select the **Points on a Surface** tool in the Message Line. The Message Line reads: *Point on Surface: Select surface(s) to distribute points on. [Ctrl = Marker* (Windows) or *Option = Marker* (Macintosh), *Shift = Extend].*

3. Enter the number of points you want distributed along the surface in two perpendicular directions in the #U and #V data fields of the Status Line. *U* and *V* represent perpendicular coordinate directions along the surface. (The letters U and V are standard identifiers for surface coordinates.)

4. Select the surface. If you want to select more than one surface, hold down the SHIFT key before selecting the first surface and while selecting succeeding surfaces.

   Points are equally distributed in a grid like pattern across the surface.

The Status Line contains the number of points to distribute in the U and V direction for the surface.

#U 5	#V 5

Geometric Characteristics

A Point is created by a single click placed in one or more locations depending on the tool used. Points are made up of the following characteristics: X, Y and Z coordinates and the Display Style of the Point (crosshair plus, crosshair x, empty diamond, empty square). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the point and choose *Window>Edit Objects* or double-click on the point.

Modifying Lines

You can modify a line in a number of ways. See Chapter 21 for information on the Editing tools. After creating a line, you can change any value including length if the line is still selected.

For example, you can type a new length, press ENTER (Windows) or RETURN (Macintosh) and the length will change. If you decide that the length is not correct, you can choose *Edit>Undo* and the line will return to the previous length. If you decide to change the length of the line again you may either select the line with the selection tool and edit information in any of the status line boxes or you may double click on the line to bring up the Edit Objects dialog box and edit all aspects of the line there.

Arc & Circle Tools

This chapter contains information on the Arc and Circle tools available in your Designer Elements program. As you create an arc or circle, the coordinate locations and radius/diameter appear in the Status Line. The arc or circle is also drawn with the current pen specifications for color, weight and pattern.

For each tool you can enter values in the Status Line to define an object, either before or after you create the object. If you enter the values after you select the tool but before you create the object, your first click in the drawing area automatically registers all Status Line values. If you enter values in the selected Status Line data field after creating the object and while the object is still selected, pressing ENTER (Windows) or RETURN (Macintosh) updates the object to reflect the new values.

The tools explained here include:

- **Center-Point Arc**
- **3-Point Arc**
- **Tangent-Point Arc**
- **Center-Point Circle**
- **Opposite-Point Circle**
- **3-Point Circle**
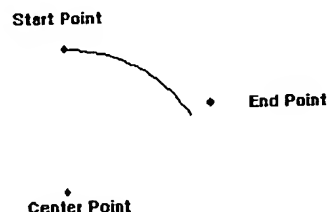- **Tangent Circle**

Arc Tools

Your Designer Elements program features three arc tools: **Center-Point Arc**, **3-Point Arc** and **Tangent Point Arc**.

Center-Point Arc Tool

This tool draws an arc based on three points: the center point, the beginning point and the end-point of the arc.
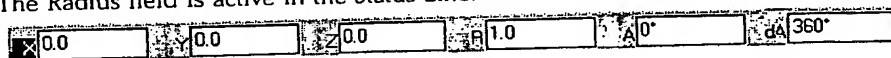
Start Point

End Point

Center Point

Using the Center-Point Arc Tool

1. Select the tool. The Message Line reads: *Center-Point Arc: Pick Center.*

2. Click the center point of the arc. The Message Line now tells you the next step in using the tool.

3. Click the beginning point of the arc which will also define the radius.

4. As you move the cursor to place the final point, a rubberband arc appears. Click the final point.

To construct an arc greater than 180°, you must create one of 180° or less, double-click the arc to bring up the Edit Objects dialog box and enter the desired degrees.

The Status Line contains the X, Y and Z coordinates of the center of the arc, the Radius, the starting angle from horizontal, A, and the delta angle from the start, dA. The Radius field is active in the Status Line.

| X 0.0	Y 0.0	Z 0.0	R 1.0	A 0°	dA 360°

Geometric Characteristics

The center-point arc is created from a center point and two arc points. Arcs are made up of the following characteristics: Diameter, Start Angle, End Angle, Start (X, Y and Z values) and End (X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the arc and choose *Window>Edit Objects* or double-click on the arc.

The Start and End Angles refer to the angles tangent to the arc point relative to the work plane.

3-Point Arc Tool
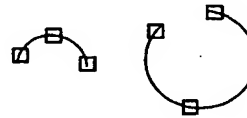
This tool draws an arc through the points you select.

Using the 3-Point Arc Tool

1. Select the tool. The Message Line reads: *3-Point Arc: Pick first point. [Ctrl = Tangent to object* (Windows) or *Option = Tangent to object* (Macintosh)]*.

2. Click the first endpoint of the arc.

    Notice that the Message Line tells you the next step for using the tool.

3. Click the second point of the arc. A rubberband arc appears as you move the cursor to a third position.

4. Click the last point of the arc. The arc is created.

The arc is drawn from the first position that you indicate, through the second position and ends at the third position. For each of the three clicks that define the arc, if the CTRL (Windows) or the OPTION (Macintosh) key is held down and you click on some other object, your Designer Elements program will define the arc to be *tangent* to that object at the nearest tangency point.

The Status Line contains the X, Y and Z coordinates for each of the three points.
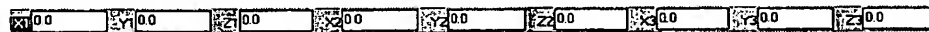
Geometric Characteristics

A 3-point arcs is created by placing three points and are made up of the following characteristics: Diameter, Start Angle, End Angle, Start (X, Y and Z values) and End (X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the arc and choose *Window>Edit Objects* or double-click on the arc.

Tangent-Point Arc Tool
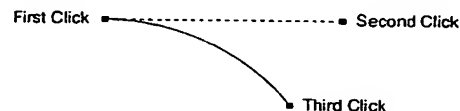
This tool draws an arc beginning at
the first point you specify. The second point you specify is the direction vector and the third point you specify indicates the endpoint of the arc. Essentially, the **Tangent-Point Arc** tool first creates a line then creates an arc tangent to the line and erases the line.

First Click ●---------------● Second Click

● Third Click

Using the Tangent-Point Arc Tool

1. Select the tool. The Message Line reads: *Tangent-Point Arc: Pick beginning point of arc (tangent line)*.

2. Click the starting point. This is both the starting point of the arc and the starting point of the temporary tangent line.

    The Message Line displays the next step for using the tool.

3. Click the endpoint of the tangent line.

4. Click the endpoint of the arc. The arc is drawn between the first and last point you click, tangent to the line between the first and second points.

The Status Line contains the X, Y and Z coordinates of the endpoints of the arc and the angle of the tangent line.

| X 0.0 | Y 0.0 | Z 0.0 | 0° | dx 0.0 | dy 0.0 | dz 0.0 |
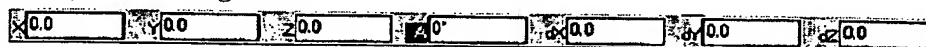
Geometric Characteristics

A tangent-points arc is created by clicking points for the tangent line and the arc and are made up of the following characteristics: Diameter, Start Angle, End Angle, Start (X,Y and Z values) and End (X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the arc and choose *Window>Edit Objects* or double-click on the arc.

Circle Tools

The Circle tools include the **Center-Point Circle**, **Opposite-Point Circle**, **3-Point Circle** and **Tangent Circle**.

The **Center-Point** tool uses the center and diameter of the circle. The **3-Point** tool uses three points and can be tangent to existing objects. The **Tangent-Point** tool draws a circle tangent to two objects, using the diameter specified by the user.

The circle is drawn with the current pen specifications for color, weight and pattern.

Center-Point Circle Tool

This tool draws a circle specified by the center point and diameter.
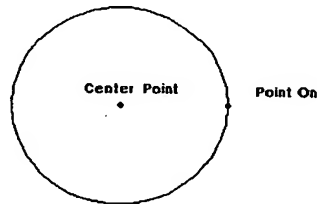
Using the Center-Point Circle Tool

1. Select the tool. The Message Line reads: *Center-Point Circle: Pick center. [Ctrl = Copy previous* (Windows) or *Option = Copy previous* (Macintosh)].

2. Click the center of the circle. A rubberband circle appears guiding your construction as you move the cursor.

3. Click the second point which determines the circle's radius.

You can create a copy of the last circle by holding down the CTRL (Windows) or the OPTION (Macintosh) key and clicking once in the drawing area to set the center point. An identical circle appears center at the point you clicked on the current work layer.

The Status Line contains the X, Y and Z coordinates of the center and the diameter of the circle. Diameter is the active status field.

X 0.0	Y 0.0	Z 0.0	D 2.0

Geometric Characteristics

A center-point circle is created by clicking the center point and a point on the circle. Circles are made up of the following characteristics: Diameter and Center (X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the circle and choose *Window>Edit Objects* or double-click on the circle.
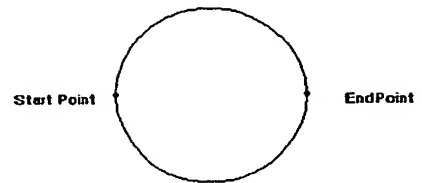
Opposite-Point Circle Tool

This tool draws a circle specified by the diameter.

Start Point **EndPoint**

Using the Opposite-Point Circle Tool

1. Select the tool. The Message Line reads: *Opposite-Point Circle: Pick first point on circle. [Ctrl = Copy previous* (Windows) or *Option = Copy previous* (Macintosh)].

2. Click two locations to indicate the diameter. After you click the first point, a rubberband circle appears to guide you in the construction.
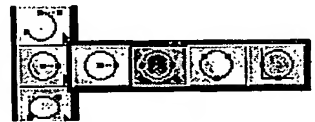
You can create a copy of the last circle by holding down the CTRL (Windows) or the OPTION (Macintosh) key and clicking once to place the center point of the new circle. An identical circle appears center at that point on the current work layer.

The Status Line allows you to specify the X, Y and Z coordinates representing the endpoints of the diameter.

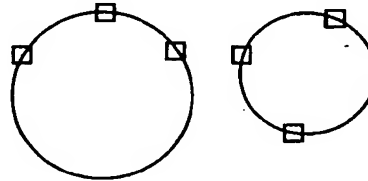| X 0.0	Y 0.0	Z 0.0	dx 0.0	dy 0.0	dz 0.0

Geometric Characteristics

An opposite-point circle is created by clicking two points to establish the diameter. Circles are made up of the following characteristics: Diameter and Center (X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the circle and choose *Window>Edit Objects* or double-click on the circle.

Tip:
You can select the center point of an opposite point circle if you display its control points using the *Show Points* command in the Layout menu.

3-Point Circle Tool

This tool draws a circle through the points you select.

Using the 3-Point Circle Tool

1. Select the tool. The Message Line reads: *3-Point Circle: Pick first point. [Ctrl = Tangent to object* (Windows) or *Option = Tangent to object* (Macintosh)].

2. Click the first point on the circle.

    Notice that the Message Line displays the next step for using the tool.

3. Click the second and third points. After the second point a rubberband circle appears guiding your construction.

If you place any of the three points on an existing object, the circle is drawn through that point. If you click an object while holding down the CTRL (Windows) or OPTION (Macintosh) key, the circle is drawn tangent to the object rather than through the indicated point. You may combine the placement of these points to create a circle through a specific point of one object and tangent to another object, or tangent to three objects, etc.

The Status Line contains the X, Y and Z coordinates for each of the three points.
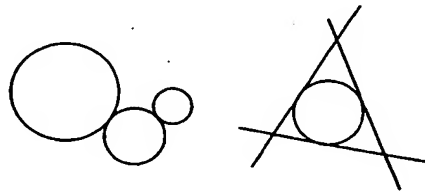
Geometric Characteristics

A 3-point circle is created by clicking three points to set the boundary of the circle. Circles are made up of the following characteristics: Diameter and Center (X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the circle and choose *Window>Edit Objects* or double-click on the circle.
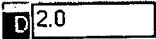
Tangent-Point Circle Tool

This tool draws a circle tangent to two objects.

Using the Tangent-Point Circle Tool

1. Select the tool. The Message Line reads: *Tangent Circle: Enter diameter then pick first tangent object.*

2. You can enter a diameter for the circle in the Status Line data field.

```
D 2.0
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3. Click the objects to which the circle is to be tangent.

Geometric Characteristics

A tangent-point circle is created by entering the circle diameter and clicking on objects to establish tangency. Circles are made up of the following characteristics: Diameter and Center (X, Y and Z values). This information is listed in the Edit Objects dialog box under the Geometry tab. To display the dialog box, select the circle and choose *Window>Edit Objects* or double-click on the circle.